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and Biology  
A Continuing  
Bibliography  
with Indexes

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National Aeronautics and  
Space Administration

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## ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)    N81-15968    N81-17980

IAA (A-10000 Series)    A81-19673    A81-23368

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

### (Supplement 219)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1981 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*



Scientific and Technical Information Branch

1981

**National Aeronautics and Space Administration**

Washington, DC

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II



# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 118 reports, articles and other documents announced during April 1981 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1981 Supplements.

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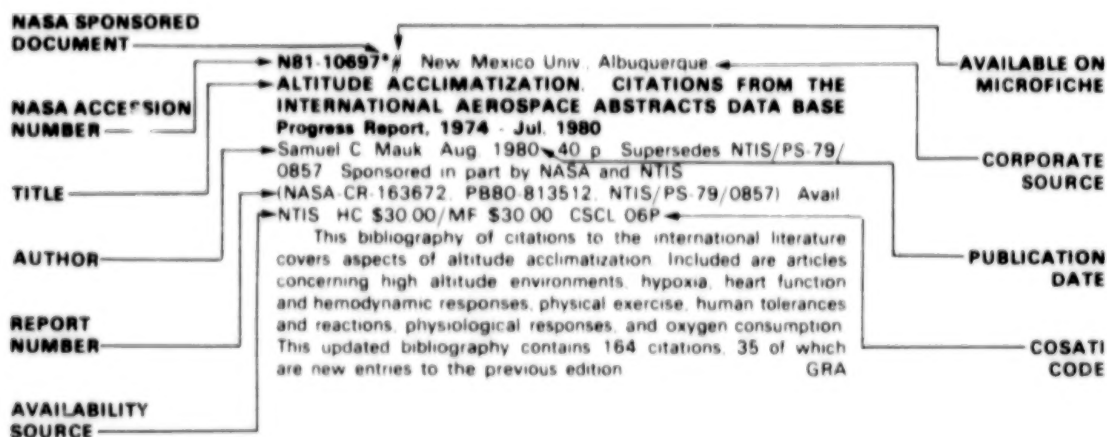
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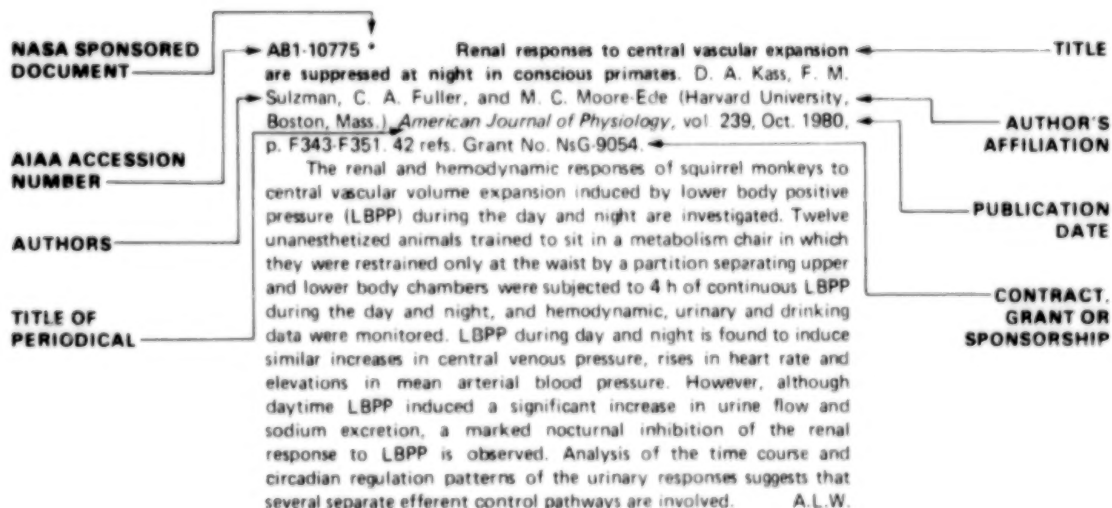
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## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 219)*

MAY 1981

## IAA ENTRIES

**A81-19678** # Heliobiological research - Present status and prospects (Geliobiologicheskie issledovaniia - Sovremennoe sostoianie i perspektivy). V. N. Benevolenskii and A. D. Voskresenskii. *Akademiia Nauk SSSR, Vestnik*, no. 10, 1980, p. 54-64. 13 refs. In Russian.

The state of knowledge on the relationships in the system 'sun-biosphere' is reviewed with reference to statistics on disease incidence and rate of mortality from suicides, noninfectious diseases, and road accidents correlated with aperiodic (magnetic storms) and periodic solar events. Consideration is given to the mechanisms of biological effects of heliophysical factors and specific reactions of living organisms to external influences related to solar activity. V.L.

**A81-19711** Current concepts in clinical cardiology: Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Edited by J. H. K. Vogel (Goleta Valley Community Hospital, Santa Barbara, Calif.). Basel, S. Karger AG (Advances in Cardiology. Volume 27), 1980. 367 p. \$118.75.

Papers are presented concerning the current status of clinical cardiology in the areas of high-altitude effects, noninvasive cardiographic techniques, coronary artery disease, pediatric heart disease, valvular heart disease and the management of cardiologic disorders. Specific topics include the clinical treatment of acute mountain sickness, methodologies and applications of two-dimensional echocardiography, the status of radionuclide imaging in the evaluation of patients with cardiovascular disease, the applicability of electrocardiographic stress testing in the detection of coronary artery disease, means for infarct size reduction and the detection and management of asymptomatic patients with coronary artery disease. Attention is also given to the state of open heart surgery in the first year of life, the status of valvular xenograft and valvular xenobioimplants, the implications and treatment of premature ventricular complexes, and the role of biochemical factors in ventricular dysrhythmia accompanying ischemia. A.L.W.

**A81-19712** Speculations on the pathogenesis of high-altitude pulmonary edema. R. F. Grover (Colorado, University, Denver, Colo.). In: Current concepts in clinical cardiology: Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 1-5. 9 refs. Grant No. NIH-14985.

Possible mechanisms for the onset of high-altitude pulmonary edema upon the extended exposure of certain healthy, fit individuals to hypoxia at altitudes above 9000 ft are considered. Evidence is presented which indicates that pulmonary hypertension is a major cause of the pulmonary edema, and possible sources of the obstruction to pulmonary blood flow are discussed, including the constriction of small muscular pulmonary arteries, the mechanical plugging of vessels by platelet clumps or thrombi, and endothelial

swelling due to exercise at high altitude. On the basis of these considerations, it is postulated that the individual susceptible to high-altitude pulmonary edema is characterized by a poor hyperventilatory response to high altitude, possibly related to an inherently small hypoxic ventilatory response. A.L.W.

**A81-19713** Acute mountain sickness - The clinical approach. P. H. Hackett (Colorado, University, Medical Center, Denver, Colo.). In: Current concepts in clinical cardiology: Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 6-10. 7 refs.

The clinical evaluation and management of acute mountain sickness are discussed. It is pointed out that although the only definitive therapy for acute mountain sickness is descent, it may not be necessary or possible in certain cases, and a scheme for the management of acute mountain sickness is presented based on the severity of the symptoms. Effective treatments are indicated for high-altitude headache (the first sign of mountain sickness), mild acute mountain sickness, which is characterized by any combination of headache, nausea or lack of appetite, insomnia and lassitude, and serious acute mountain sickness, which is characterized by additional symptoms including vomiting, severe headache, ataxia and severe shortness of breath. Treatment to be performed prior to and during descent in cases of high-altitude pulmonary edema and cerebral edema are also pointed out. It is noted that persons having recovered from acute mountain sickness can usually reascend, as long as it is done slowly and cautiously, and with proper prophylactic measures. A.L.W.

**A81-19714** Two-dimensional echocardiography - Methodology and application in clinical cardiology. R. P. Martin (Virginia, University, Charlottesville, Va.). In: Current concepts in clinical cardiology: Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 17-39. 14 refs.

The clinical application of two-dimensional echocardiography as a diagnostic tool is discussed. The development of wide-angle real-time systems which could produce tomographic sections or images of the heart in a dynamic format is reviewed, and the various types of electrical and mechanical real-time sector scanners are presented, including linear and phased arrays, and single and multiple transducers. The views affordable by two-dimensional echocardiography are then examined, with attention given to the advantages and means of obtaining the parasternal long-axis view, the parasternal short-axis views, the apical long-axis view, the apical short-axis view and the subxyphoid views. Means of applying two-dimensional echocardiography in the evaluation of left ventricular function and coronary artery disease, myopathies, valvular abnormalities and pericardial abnormalities are discussed, and limitations to the current state of the art are pointed out. A.L.W.

**A81-19715** Echocardiographic studies evaluating the effects of exercise training on the heart. V. F. Froelicher (University Hospital, San Diego, Calif.). In: Current concepts in clinical

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cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979.  
Basel, S. Karger AG, 1980, p. 51-57. 10 refs. Grant No. NIH-HL-17682.

**A81-19716 Electrocardiographic stress testing - The debate goes on /probably/. J. S. Forrester (Cedars-Sinai Medical Center, Los Angeles, Calif.) and G. A. Diamond (California, University, Los Angeles, Calif.). In: Current concepts in clinical cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 83-92. 18 refs.**

Various approaches to the interpretation of the results of electrocardiographic stress testing are evaluated in light of the current controversy over the diagnostic value of the stress test. Consideration is given to the values and limitations of the categorical approach, whereby the stress test is categorized as positive or negative based on the ST segment response alone, the judgemental approach, which includes the judgement of an experienced clinician, the ordinal approach, which assigns arbitrary weightings to judgemental factors, the multivariate approach, in which each clinical modifier is mathematically weighted, and the probabilistic approach, which determines the probability of coronary artery disease in a patient on the basis of Bayes' theorem. It is suggested that due to the strengths and weaknesses of all the approaches examined, a combination of techniques, specifically initial probabilistic analysis modified by judgemental interpretation, may represent the optimum synthesis of the most desirable aspects of the various methods of electrocardiographic stress test interpretation. A.L.W.

**A81-19717 Detection and management of the asymptomatic patient with coronary artery disease. C. R. Conti (Florida, University, Gainesville, Fla.). In: Current concepts in clinical cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 181-190. 9 refs.**

Methods for the detection and management of coronary artery disease in patients lacking coronary symptoms are discussed. Results of a study illustrating the inconsistency of symptoms in patients with transient electrocardiographic evidence of myocardial ischemia are indicated, and a case history demonstrating the problems of interpreting a positive exercise stress test in an asymptomatic individual is presented. Experimental confirmations performed by means of exercise thallium perfusion and exercise isotope angiography of coronary artery disease in asymptomatic patients are pointed out, as well as the confirmation by angiography of coronary artery disease in 10 out of a sample of 17 asymptomatic patients with a positive stress test. Guidelines are presented for the systematic evaluation of asymptomatic individuals who present with a positive exercise stress test, and an approach is suggested to the management of patients who have not exhibited pain during exercise-induced S-T segment depression and who have undergone coronary angiography. A.L.W.

**A81-19718 Does exercise protect from coronary artery disease. V. F. Froelicher (University Hospital, San Diego, Calif.). In: Current concepts in clinical cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979. Basel, S. Karger AG, 1980, p. 237-242. Grant No. NIH-HL-17682.**

Results of recent epidemiological studies of the relation of physical activity levels to the incidence of coronary artery disease are presented in an attempt to evaluate the relative contributions of physical activity per se and selection for physical activity to the observed lower incidence of the disease in physically active populations. Consideration is given to the longitudinal studies of longshoremen and college alumni with different levels of energy output reported by Paffenbarger et al. (1978). The studies are shown to support the protective rather than the selective effects of physical

exercise, which is found to most likely decrease the risk for coronary heart disease as well as other risk factors for coronary disease.

A.L.W.

**A81-19719 Premature ventricular complexes - Therapeutic dilemmas and decisions. D. W. Snyder, D. J. Sheridan, and B. E. Sobel (Washington University, St. Louis, Mo.). In: Current concepts in clinical cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979.**

Basel, S. Karger AG, 1980, p. 322-342. 80 refs. Grant No. NIH-HL-17646.

The diagnosis, incidence and treatment of ventricular ectopic activity (VEA) are discussed. The diagnostic features of typical premature ventricular complexes (PVCs) are indicated, and the Lown classification of PVC severity on the basis of frequency, electrocardiographic morphology and timing is introduced. The incidence of VEA in the pre-hospital, early hospital, late hospital and convalescent phases of acute myocardial infarction, in ambulatory patients with stable coronary artery disease and in ostensibly normal subjects is examined, and it is pointed out that adult subjects with high-grade VEA have an increased risk of sudden death, most likely reflecting a predisposition to ventricular fibrillation. Approaches to the pharmacological, electrical and surgical management of VEA are considered, indications for treatment are discussed, and it is argued that low-grade VEA does not require treatment in ambulatory patients without specific indications. A.L.W.

**A81-19720 The role of biochemical factors in ventricular dysrhythmia accompanying ischemia. P. B. Corr and B. E. Sobel (Washington University, St. Louis, Mo.). In: Current concepts in clinical cardiology; Proceedings of the Tenth Conference on Cardiovascular Disease, Aspen, Colo., January 15-19, 1979.**

Basel, S. Karger AG, 1980, p. 346-360. 50 refs. Grants No. NIH-NL-17646; No. NIH-HL-21654.

The role of biochemical factors in precipitating the electrophysiological changes characterizing malignant ventricular dysrhythmia which accompany ischemia is discussed. The nature of the electrophysiological changes observed in vitro and in vivo in heart tissue after ischemia is considered, and the possible roles of slow-response action potentials in dysrhythmias early after the onset of ischemia and of reperfusion are pointed out. The effects of metabolic and biochemical factors, including hypoxia, lactate, pH and mono- and divalent cation concentrations, on ventricular electrophysiology are then examined, together with the possible influence of the autonomic nervous system, cyclic AMP accumulation, free fatty acids and fatty acid esters and lysophosphoglycerides. It is concluded that regional, heterogeneous accumulations of noxious ions and metabolites as well as hypoxia play a significant role in mediating the effects of ischemia on ventricular function, and that elucidation of the biochemical mechanisms responsible is of particular importance to the development of therapeutic interventions of high specificity. A.L.W.

**A81-19841 A hierarchical programming approach to robot assembly. D. S. Seltzer. In: Advanced manufacturing technology: Programming research and operations logistics; Proceedings of the Fourth International Conference, Ann Arbor, Mich., May 21-23, 1979. Amsterdam, North-Holland Publishing Co., 1980, p. 237-246. 11 refs.**

A software control system was developed for industrial assemblies by a multiaxis manipulator which partitions the programming tasks into a four level programmer hierarchy. This allows the operation of a sophisticated software system by floor personnel without programming experience. The first level of the hierarchy is the Systems Programmer responsible for the framework of the run-time system; a Strategy Programmer writes a library of general Fortran strategy routines; a Task Sequence Programmer uses this library in solving particular tasks; and finally, the Shop Floor Programmer/Operator provides the real world positioning information using the manipulator arm as a surveying instrument. A.T.



**A81-19842**      **Partly unmanned machining.** O. Bjarke and A. Rolstadas. In: *Advanced manufacturing technology: Programming research and operations logistics*; Proceedings of the Fourth International Conference, Ann Arbor, Mich., May 21-23, 1979.

Amsterdam, North-Holland Publishing Co., 1980, p. 271-284. 6 refs.

A manufacturing system design using the building block principle so that it is constructed of conventional parts permitting evolutionary development is discussed. Motion, state survey, and diagnostic functions can be included in a system which is implemented as a hierarchy consisting of the machine tool, the cell, and the total factory. The control system can be divided into management, technology, direct equipment, and diagnosis control portions. A.T.

**A81-19900**      **Dynamics of the state of redox systems in structural elements of the cerebral cortex during oxygen deficiency /cytophotometric study in vivo/ (Dinamika sostoiianiia redoks-sistem strukturnykh elementov kory mozga pri kislorodnom golodanii /prizhiznennoe tsitofotometricheskoe issledovanie/).** M. O. Samoilov, D. G. Semenov, and A. N. Derii (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 255, no. 3, 1980, p. 766-768. 11 refs. In Russian.

Quantitative studies were used to determine redox system dynamics in various types of pyramidal neurons and in adjacent areas of the sensorimotor region in the cerebral cortex of cats and rabbits. In vivo measurements of nearby oxygen tension and spectrophotometric recordings of oxidized forms of staining solutions were employed to study effects of hypoxia levels. Factors responsible for disturbances of redox processes on the cellular level are discussed.

T.M.

**A81-20052**      **Effects of internal noise on helicopter operation - An aircrew view.** J. E. Maitland (RAF, London, England). In: *Symposium on Internal Noise in Helicopters*, Southampton, England, July 17-20, 1979, Proceedings. Southampton, England, University of Southampton, 1980, p. A1 1, A1 2.

Various factors bearing on internal helicopter noise are discussed in the context of effective helicopter operation. Light structures, such as honeycomb, are necessary to ensure structural integrity under battle conditions, even though such structures may increase internal noise levels owing to their resonance. It is also noted that quilted insulating materials add to the weight and pose a fire hazard when saturated with oil or hydraulic fluid. Noise can even be useful; changes in pitch or intensity may warn of such faults as fluctuations in rotor RPM or trouble in an ancillary drive. On the other hand, noise interferes with communication between crew members. It also induces fatigue and makes direct-voice rebriefing of troops being transported by helicopter difficult. Noise may also raise the stress experienced by a rescued person. Improvements must therefore be made only when all operational needs are considered. C.R.

**A81-20056**      **The effective acoustic environment of helicopter crewman.** R. T. Camp, Jr. (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). In: *Symposium on Internal Noise in Helicopters*, Southampton, England, July 17-20, 1979, Proceedings.

Southampton, England, University of Southampton, 1980, p. B1 1-B1 4.

One of the primary reasons for quantification of the acoustic noise in helicopters is to assess the acoustic hazards to the crew and passengers. The usual sound-level meter or dosimeter measures of the internal and external noise levels do not yield a good estimate of the actual or 'effective acoustic environment' of the crew and passengers. Realistic estimates of the effective acoustic environments require the application of reliable narrow-band analyses of the noise from all sources including the system noise of electronic communication systems, the spectra of which must be corrected for its attenuation characteristics of helmets and hearing protectors. The problems of ascertaining the composite acoustic stimuli and the application of corrections for other variables that affect the effective acoustic environment are included in this presentation. (Author)

**A81-20057**      **Acceptance and control of aircraft interior noise and vibration.** D. G. Stephens and J. D. Leatherwood (NASA, Langley Research Center, Hampton, Va.). In: *Symposium on Internal Noise in Helicopters*, Southampton, England, July 17-20, 1979, Proceedings. Southampton, England, University of Southampton, 1980, p. B2 1-B2 14. 22 refs.

Ride quality criteria for noise, vibration, and their combination in the helicopter cabin environment are discussed. Results are presented of laboratory and field studies of passenger responses to interior noise and vibration during the performance of a listening task and during reverie, as well as to the interaction of noise with multi-frequency and multi-axis vibration. A study of means for reducing helicopter interior noise based on analytical, experimental and flight studies of the near-field noise source characteristics of the aircraft, the transmission of noise through aircraft structure, and the attenuation of noise by various noise control treatments is then presented which has resulted in a reduction of 3 dB in helicopter cabin noise. Finally, a model under development to evaluate passenger acceptance of a helicopter noise and vibration environment is indicated which incorporates the observed noise and vibration effects on comfort and is expected to provide insights for more effective noise and vibration control. A.L.W.

**A81-20059**      **Factors affecting acceptable noise levels in helicopters.** K. R. Maslen (Royal Aircraft Establishment, Human Engineering Div., Farnborough, Hants, England). In: *Symposium on Internal Noise in Helicopters*, Southampton, England, July 17-20, 1979, Proceedings. Southampton, England, University of Southampton, 1980, p. B4 1-B4 9. 14 refs.

Difficulties encountered in defining acceptable noise levels inside helicopters are discussed. Since the bulk of helicopter noise is of low frequency and contains narrow bands of high sound pressure levels, there is a danger of indirect masking of speech and other signals. The low-frequency noise and infrasound, especially when combined with vibration, may have disturbing subjective effects, and isolated noise peaks may cause annoyance. It is thought that the danger of incurring permanent hearing loss in helicopter noise will differ from that in fixed-wing aircraft for the same A-weighted levels at the ear. C.R.

**A81-20467**      **Human factors by descent energy management.** R. E. Curry (NASA, Ames Research Center, Aviation Safety Research Office, Moffett Field, Calif.). In: *Conference on Decision and Control, and Symposium on Adaptive Processes*, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings. Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 422-426. 5 refs.

This paper describes some of the results of a human factors study of energy management during descent using standard aircraft displays. Discussions with pilots highlighted the practical constraints involved and the techniques (algorithms) used to accomplish the descent. The advantages and disadvantages of these algorithms are examined with respect to workload and their sensitivity to disturbances. Vertical navigation and flight performance computers are discussed in terms of the information needed for effective pilot monitoring and takeover. (Author)

**A81-20499**      **Mental workload in decision and control.** T. B. Sheridan (MIT, Cambridge, Mass.). In: *Conference on Decision and Control, and Symposium on Adaptive Processes*, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings. Volume 2.

Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 9/7-982. 21 refs. U.S. Department of Transportation Contract No. OS-70055; Grant No. NSG-2118.

This paper briefly reviews the problems of defining and measuring the 'mental workload' of aircraft pilots and other human operators of complex dynamic systems. Of the alternative approaches the author indicates a clear preference for the use of subjective scaling. Some recent experiments from MIT and elsewhere

are described which utilize subjective mental workload scales in conjunction with human decision and control tasks in the laboratory. Finally a new three-dimensional mental workload rating scale, under current development for use by IFR aircraft pilots, is presented.

(Author)

**A81-20500** Frequency domain measures of human performance under G-stress. J. Korn, D. L. Kleiman (Connecticut, University, Storrs, Conn.), and D. W. Reppeger (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). In: Conference on Decision and Control, and Symposium on Adaptive Processes, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings, Volume 2. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 983-988. 13 refs. Contract No. F33615 78-C-0517.

Results of compensatory tracking experiments under G-stress are presented which confirm the hypothesis that human performance deteriorates under linear acceleration. The optimal control model (OCM) validates the experimental data. It is shown that the OCM parameters which are most affected include the motor noise, observation noise, neuromotor time constant, and reaction time-delay, all of which significantly increase under G-stress. In addition, some accumulative G-effects are evident as the neuromotor time constant remains higher than nominal in the post-G runs, reflecting a lower control bandwidth and perhaps fatigue.

V.L.

**A81-20501 \*** Human controller modeling in environments that include non-control tasks. T. Govindaraj (Purdue University, West Lafayette, Ind.), and W. B. Rouse. In: Conference on Decision and Control, and Symposium on Adaptive Processes, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings, Volume 2. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 989-994. 7 refs. Grant No. NSG-2119.

In complex environments where the human operator is a supervisor, he must allocate his attention between different kinds of tasks for optimum overall performance. When a portion of the future reference trajectory for the control task is available for preview, scheduling various activities is possible. A model has been developed for this situation using dynamic programming to solve an optimal control problem. An experiment was conducted where subjects controlled an airplane symbol over a map, shown a fixed distance into the future. Discrete, non-control tasks were introduced as number entry tasks. Results from the model are compared with experimental results.

(Author)

**A81-20502** Helicopter pilot performance and workload as a function of night vision symbologies. E. J. Hartzell (U.S. Army, Aeromechanics Laboratory, Moffett Field, Calif.). In: Conference on Decision and Control, and Symposium on Adaptive Processes, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings, Volume 2. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 995-996.

A full six-degree-of-freedom motion simulation of an advanced U.S. Army helicopter flying a night time nap-of-the-earth scenario was conducted in order to assess pilot performance, training requirements, and workload as a function of the flight control symbologies used. The results of the time estimation techniques used in conjunction with this experiment support the predicted levels of difficulty designed into the flight scenario. Time estimation provides a relative scale of workload between hover maneuvers and suggests that there is no significant difference in workload between the three symbology types studied.

V.L.

**A81-20503** Evaluation and prediction of the vertical situation from a horizontal situation display. S. G. Hart and L. L. Loomis (Tufts University, Medford, Mass.). In: Conference on Decision and Control, and Symposium on Adaptive Processes, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings, Volume 2.

Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 997-1001.

This study was designed to provide additional information about the content, symbology, and format of a cockpit display of traffic information (CDTI). Several different symbols for other aircraft and different ways to display information about its status that pilots had preferred in an earlier survey based on static displays and pilot opinion were evaluated. In addition, different features of the vertical and horizontal situation of two aircraft (e.g. angular separation, relative altitude, difference in ground speed) were studied to determine the interaction between parameters of an encounter between two aircraft displayed on a simple dynamic CDTI and display symbologies on pilot perception of relative motion and separation.

(Author)

**A81-20511 \*** An analysis of the human as a predictor model. J. G. Kreifeldt (Tufts University, Medford, Mass.). In: Conference on Decision and Control, and Symposium on Adaptive Processes, 18th, Fort Lauderdale, Fla., December 12-14, 1979, Proceedings, Volume 2. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1979, p. 1074-1077. 7 refs. Grant No. NSG-2156.

A hybrid sampled data-continuous impulse response of a preview tracker using a fast time model predictor aid is derived. The model can accept transient and nontransient inputs and is suitable for studying a human preview tracker using an internalized or externalized predictor display. The model is shown to behave reasonably in a simple example and its implications for modeling studies are discussed.

(Author)

**A81-20845 #** The colony-forming capacity of bone marrow cells in a tissue culture after uniform and nonuniform radiation (O kolonieobrazuiushchei sposobnosti kletok kostnogo mozga v kul'ture tkani posle ravnomernogo i neravnomernogo oblucheniia). L. B. Berlin, T. D. Pozharisskaia, E. N. Sokolova, and A. D. Smirnov (Voenno-Meditsinskaiia Akademiia, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 255, no. 4, 1980, p. 983-985. 6 refs. In Russian.

**A81-20849 #** The flowering and ripening of Arabidopsis seeds under weightlessness conditions - Biosatellite Kosmos 1129 experiment (Tsveteniie i sozrevanie semian Arabidopsisa v nevesomosti - Eksperiment na biosputnike 'Kosmos-1129'). G. P. Parfenov and V. M. Abramova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 256, no. 1, 1981, p. 254-256. 15 refs. In Russian.

The generative cycle of Arabidopsis thaliana, paca Erckheim-1 seeds was observed under weightless conditions of spaceflight for 18 days from the fertilization stage through its ripening. The number of fertile seeds sharply decreased and the quantity of abortive formations increased during the flight; this increase resulted from unfavorable conditions of weightlessness, and were not of hereditary nature.

A.T.

**A81-20916 \*** Cockpit displayed traffic information and distributed management in air traffic control. J. G. Kreifeldt (Tufts University, Medford, Mass.). *Human Factors*, vol. 22, Dec. 1980, p. 671-691. 24 refs. Grant No. NSG-2156.

A graphical display of information (such as surrounding aircraft and navigation routes) in the cockpit on a cathode ray tube has been proposed for improving the safety, orderliness, and expeditiousness of the air traffic control system. An investigation of this method at NASA-Ames indicated a large reduction in controller verbal work load without increasing pilot verbal load; the visual work may be increased. The cockpit displayed traffic and navigation information system reduced response delays permitting pilots to maintain their spacing more closely and precisely than when depending entirely on controller-issued radar vectors and speed command.

A.T.

**A81-20917** Predicting search performance for multiple targets. T. Morawski, C. G. Drury, and M. H. Karwan (New York, State University, Amherst, N.Y.). *Human Factors*, vol. 22, Dec. 1980, p. 707-718. 18 refs.

Performance in a visual search task is usually measured by the cumulative probability of locating a target,  $F(t)$ , in a given time ( $t$ ). Two extreme  $F(t)$  against ( $t$ ) relationships have been postulated, one assuming that search is random, and the other assuming that search is systematic. However, these relationships have been available for the situation in which each search field contains a single occurrence of a single type of target. This paper extends both search models (random and systematic) first to the case of multiple occurrences of a single fault type within a search field and second to the case of multiple fault types. For systematic search, these two cases can be combined to predict the effects of multiple occurrences of multiple fault types. The general  $F(t)$  relationships are given in each case and illustrated with a worked example. (Author)

**AB1-20925** Implications of a critical level in the ear for assessment of noise hazard at high intensities. G. R. Price (U.S. Army, Human Engineering Laboratory, Aberdeen Proving Ground, Md.). *Acoustical Society of America, Journal*, vol. 69, Jan. 1981, p. 171-177. 33 refs.

The argument is advanced that there is a critical level (CL) for the ear at high intensities where the loss mechanism undergoes a fundamental change. In physiological terms, CL probably represents the intensity at which a given level of mechanical stress is reached in the Organ of Corti. Electrophysiological, histological, and threshold shift data support this contention. Further, CL varies as a function of the spectrum of the sound. A preliminary estimate of the freefield SPL reaching CL in the human ear has been calculated as has been the distribution of CL. The implications for human exposure and damage-risk criteria are discussed. (Author)

**AB1-21020** A recursive Lagrangian formulation of manipulator dynamics and a comparative study of dynamics formulation complexity. J. M. Hollerbach (MIT, Cambridge, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, Nov. 1980, p. 730-736. 23 refs. Contract No. N00014-77-C-0389.

An efficient Lagrangian formulation of manipulator dynamics has been developed. The efficiency derives from recurrence relations for the velocities, accelerations, and generalized forces. The number of additions and multiplications varies linearly with the number of joints, as opposed to past Lagrangian dynamics formulations with a fourth-power joint number dependence. With this formulation it should be possible in principle to compute the Lagrangian dynamics in real time. The computational complexities of this and other dynamics formulations including recent Newton-Euler formulations and tabular formulations are compared. It is concluded that recursive formulations based either on the Lagrangian or Newton-Euler dynamics offer the best method of dynamics calculation. (Author)

**AB1-21023** A stochastic differential game theory approach to human operators in adversary tracking encounters. J. L. Speyer (Texas, University, Austin, Tex.), S. Samn, and R. Albanese (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, Nov. 1980, p. 755-762. 22 refs.

The paper examines whether conclusions based upon passive signal analysis using linear quadratic Gaussian differential game theory with perfect state information are applicable to the complex adversary encounter. It is shown that the available information on passive (compensatory) tracking may be extended to the case when the display is perturbed by a second intelligent operator acting as an adversary. Conclusions based on passive encounter usually do not predict the active encounter; an example is given of the tracking error variance and control effort computed for the passive case which are smaller than that predicted by the active encounter. A.T.

**AB1-21024** Master-slave manipulator performance for various dynamic characteristics and positioning task parameters. W. J. Book and D. P. Hannema (Georgia Institute of Technology,

Atlanta, Ga.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, Nov. 1980, p. 764-771. 17 refs. Research supported by Du Pont de Nemours and Co.; Grant No. NIH-5-505-R-7-24-10.

The relationship between the performance of an experimental master-slave manipulator and natural frequency, Coulomb friction, and backlash was quantified by time measurements for accomplishing a simple positioning task. Statistical analysis indicated that a simple linear model could be constructed to relate the task parameters of distance and width to manipulator performance and characteristics. The results can be used for the cost-performance tradeoff of the manipulator design; they have been interpreted in terms of an information transmission model of the man-machine system with separate transmission rates for gross motions and a point of transfer between the two motions. A.T.

**AB1-21031** Learning and control for a compliant computer-controlled manipulator. A. Liégeois, E. Dombre, and P. Borrel (Montpellier II, Université, Montpellier, France). *IEEE Transactions on Automatic Control*, vol. AC-25, Dec. 1980, p. 1097-1102. 18 refs.

Precise automated manipulation and assembly by means of a computer-controlled manipulator with elastic drives require a model of the compliant structure. A calibration procedure based on a learning technique is used to identify the structural parameters of the model. The force reflecting performances of the cable drives makes possible simple continuous active accommodations to adapt the apparent compliance in the task space during fine motions. The damping of oscillations induced by fast transient motions is carried out by means of measurements of cable deformations and their derivatives. Experimental results with a computer-controlled slave telemanipulator show that performance may be improved by adaptive control. (Author)

**AB1-21125** # Data acquisition system for thermal stress studies. R. P. Layton and W. H. Mints, Jr. (U.S. Naval Medical Research Institute, Bethesda, Md.). *American Society of Mechanical Engineers, Winter Annual Meeting, Chicago, Ill., Nov. 16-21, 1980, Paper 80-WA/OCE-14*, 3 p. Members, \$2.00; nonmembers, \$4.00.

A system is described that monitors cutaneous heat flow and temperature at individual body sites using commercial thermoelectric heat flow transducers and thermistors. The system can operate either dry or immersed in water at pressures up to 16 atmospheres absolute (ATA) and at ambient temperatures between 0 C and 50 C. The data output from the 15 heat flux transducers and 15 thermistor temperature sensors are presented as a two-channel multiplexed signal. The small size of the system and output cable give the subject freedom of movement for performing various tasks with minimal hindrance from the monitoring package. Designed to monitor exposure to cold stress in hyperbaric environments, this system is directly applicable to studies of thermal stress in general and easily can be adapted to accommodate the requirements of other physiological studies. (Author)

**AB1-21450** # On the binaural processing of stimuli with different interaural phase relations. J. Raatgever. Delft, Technische Hogeschool, Doctor in de technische Wetenschappen Dissertation, 1980. 133 p. 99 refs.

Binaural hearing mechanisms are examined with regard to the processing of interaural time differences. The internal coding of interaural time differences in the temporal fine structure of binaural stimuli is investigated; consequently, signals containing frequency parts below 1600 Hz are of interest. Particular consideration is given to dichotic pitch, lateralization of low-frequency signals, a spectral model for lateralization and dichotic pitch, lateralization of different dichotic pitch phenomena, and binaural masking with dichotic pitch stimuli. B.J.

**AB1-21471** Control of breathing during prolonged exercise. B. J. Martin, E. J. Morgan, C. W. Zwillich, and J. V. Weil (Colorado, University, Medical Center, Denver, Colo.). *Journal of*



**Applied Physiology: Respiratory, Environmental and Exercise Physiology**, vol. 50, Jan. 1981, p. 27-31. 30 refs. Grant No. NIH-HL-14985.

Mechanisms for the steady upward drift of minute ventilation throughout prolonged heavy exercise are investigated. The roles of elevated body temperature, lactate and catecholamine levels, increased metabolic rate and changes in respiratory pattern were examined during one hour of bicycle ergometer exercise at 2/3 maximal aerobic capacity in ten healthy subjects, during which minute ventilation was observed to increase by 13%. The rise in ventilation is not found to be affected by an artificial elevation of body temperature, and to occur despite unchanged arterial CO<sub>2</sub> pressure, lactate and pH levels and CO<sub>2</sub> ventilation. The ventilation increase is attributed to increased dead space ventilation, with tidal volume unchanged, which cannot be accounted for by rapid shallow breathing. The factors responsible for the observed upward drift in minute ventilation thus remain undetermined. A.L.W.

**A81-21472 Responses to dry heat of men and women with similar aerobic capacities.** A. J. Frye and E. Kamon (Pennsylvania State University, University Park, Pa.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 50, Jan. 1981, p. 65-70. 25 refs.

**A81-21473 \* Plasma volume, osmolality, vasopressin, and renin activity during graded exercise in man.** V. A. Convertino, L. C. Keil, E. M. Bernauer, and J. E. Greenleaf (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 50, Jan. 1981, p. 123-128. 33 refs. Grant No. NCA2-OR-180-703.

The influence of work intensity on plasma volume, osmolality, vasopressin and renin activity and the interrelationships between these responses are investigated. Plasma volume, renin activity and osmotic, sodium and arginine vasopressin concentrations were measured in venous blood samples taken from 15 healthy male subjects before and after six minutes of bicycle ergometer exercise at 100, 175 and 225 W. Plasma volume is found to decrease significantly with increasing work intensity, while increases in Na<sup>+</sup> concentration, osmolality and vasopressin are only observed to be significant when the work intensity exceeds 40% maximal aerobic capacity and plasma renin activity increased linearly at all work levels. In addition, significant correlations are observed between plasma volume and osmolality and sodium changes, and between vasopressin and osmolality and sodium content changes. Data thus support the hypotheses that (1) vasopressin may be the primary controlling endocrine for fluid and electrolyte levels following exercise; (2) an exercise intensity greater than 40% maximal aerobic capacity is required to stimulate vasopressin release through changes in plasma osmolality; and (3) the stimulation of the renin-angiotensin system is a more general stress response. A.L.W.

**A81-21474 Diffusing capacity of the lung during hypoxia - Role of capillary recruitment.** R. L. Capen, L. P. Latham, and W. W. Wagner, Jr. (Colorado, University, Denver, Colo.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 50, Jan. 1981, p. 165-171. 34 refs. Grants No. NIH-HL-14985; No. NIH-HL-07171.

The effects of lung capillary recruitment induced by hypoxia on the diffusing capacity of the lung are investigated. In vivo microscopy of healthy adult dogs was performed to monitor capillary recruitment in the upper part of the lung, and lung diffusing capacity for carbon monoxide was measured during conditions of normoxia, hypoxia, hypoxia with the intravenous infusion of a vasodilator, and normoxia with continuing vasodilator infusion. The pulmonary diffusing capacity as measured by a rebreathing technique is found to be significantly correlated with the extent of capillary perfusion under both hypoxic and normoxic conditions, even with the acceleration of the reaction rate between carbon monoxide and hemoglobin under hypoxic conditions taken into account. The

evidence thus suggests that the capillary recruitment elicited during airway hypoxia causes an increase in the diffusion rate and is of physiological benefit, and that the microscopic observations are representative of much of the lung. A.L.W.

**A81-21726 \* The role of simulation in Space Shuttle training.** J. W. Bilodeau (NASA, Johnson Space Center, Houston, Tex.). In: Summer Computer Simulation Conference, Toronto, Canada, July 16-18, 1979, Proceedings. Montvale, N.J., AFIPS Press, 1980, p. 813-818.

The content and the scope of the flight crew training program for the Space Shuttle are discussed with emphasis on the role of simulation in such training. The training flow chart is presented and requirements in hours are given for each of the subject areas. V.L.

**A81-21727 An integrated training approach.** A. D. Windsor (U.S. Navy, Corpus Christi, Tex.) and H. Brouwer (Gould, Inc., Melville, N.Y.). In: Summer Computer Simulation Conference, Toronto, Canada, July 16-18, 1979, Proceedings. Montvale, N.J., AFIPS Press, 1980, p. 821, 822.

The training program for U.S. Navy pilots that has evolved in response to high turnover and rising costs is discussed. It is noted that the Navy Integrated Flight Training System introduces instrument flying skills very early in the pilot's course. Here, systems operations training is facilitated by the use of specially designed, computer driven graphic panels that provide visual representation of system functions in both normal and degraded conditions. Trainees move next to the procedures trainer and then to the flight simulator. It is noted that training devices provide effective initial training for student pilots, maintain and improve the proficiency of experienced pilots, reduce training and operating costs, and conserve scarce resources, such as energy, weapons, and ammunition. C.R.

**A81-21728 Task segmentation - An approach to simulator task fidelity.** E. A. Stark (Singer Co., Link Div., Binghamton, N.Y.). In: Summer Computer Simulation Conference, Toronto, Canada, July 16-18, 1979, Proceedings. Montvale, N.J., AFIPS Press, 1980, p. 835-838.

It is noted that the complex motion and visual cuing systems offered by simulators today provide more information than is required for effective training. Attention is also given to the high cost of these simulators. The need for a careful identification of task/cue relationships and dynamics is stressed. A method of analyzing skilled operator tasks as more or less complex procedures is proposed as a way of identifying the minimum simulator complexity required for full task fidelity. Three distinct phases of learning - cognitive, perceptual, and psychomotor - are identified, and the role to be played by the simulator in each phase is discussed. It is noted that the first approach to the definition of minimum cue requirements is in the segmentation of the maneuvers to be learned. It is concluded that while providing very little information by itself, segmentation furnishes a structure in which simulator designers, training analysts, instructors, and pilots can explore the processes by which flight skills are developed and maintained. C.R.

**A81-21923 # Analysis and modeling of the cephalic response of a human operator subjected to binaural stimulation in a sound localization task (Analyse et modélisation de la réponse céphalique d'un opérateur humain soumis à une stimulation binaurale dans une tâche de localisation d'un son).** J.-P. Bourrieres. Lille I, Université, Docteur-Ingénieur Thesis, 1979. 181 p. 43 refs. In French. Research supported by the Direction des Recherches, Etudes et Techniques.

Systematic relationships are obtained between the physical characteristics of binaural sound stimuli and the perception of the lateral position of the sound source. The objective parameters of binaural hearing are reviewed, with particular attention given to the spatial and energetic characteristics of binaural stimulation. An

experimental apparatus developed to investigate perceptual responses to binaural stimulation is then presented in which head position is used to indicate the sound source position, and in which the operator is placed in the loop as the error detector. Means for the processing of the input signal and output head response data are examined, and statistical results concerning the abilities of the 10 subjects to localize the sources are presented. A behavioral model is then proposed to explain the results based on the mean response to a position corresponding to the eccentricity of the sound source.

A.L.W.

**A81-21987 # Development of a secondary task method for measuring operator workload. II - A change of secondary task performance with acquisition of flying skill by Link Trainer.** Y. Nagasawa, H. Hagihara, S. Aramaki, and N. Utsuki (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 21, June 1980, p. 61-73. 6 refs. In Japanese, with abstract in English.

**A81-21988 # Experimental studies on the survival capacity in the sealed environment. I - Effect of cooping up in the individual sealed chamber of various volume on survival time in rats of various body weight.** H. Fujiwara (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 21, June 1980, p. 75-86. 37 refs. In Japanese, with abstract in English.

The effects of sealed environments on the survival times and the lethal concentration of oxygen and carbon dioxide in 45 Sprague-Dawley male rats is evaluated. Mean survival times are given for each group of 60, 210 and 420 grams in body weight for sealed chambers of 10, 20 and 30 liter volume. The mean lethal concentrations of oxygen and carbon dioxide were 2.9 plus or minus .9% and 14.7 plus or minus .3% respectively for all groups. L.S.

**A81-21989 # Structural analysis of factor patterns on EEG under various states of consciousness.** Y. Kurihara (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 21, June 1980, p. 87-101. 58 refs. In Japanese, with abstract in English.

The direct varimax method of factor analysis was applied to the electroencephalogram to investigate the effects under 12 situations of consciousness. A small number of common factors in the EEG were used. Correlation coefficients of the factor loading patterns were very high, suggesting the stability of the factor loading. L.S.

**A81-21990 # Statistical studies on blood pressure of JASDF pilots. III - Relationship between physical constitution and blood pressure.** Y. Kurihara (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 21, June 1980, p. 103-114. 65 refs. In Japanese, with abstract in English.

**A81-22077 Evaluation of full-head enclosed breathing system for extended exposure at high altitude.** G. Dixon, J. D. Adams, and A. Moore (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings*. Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 12-14.

An evaluation of a full-head enclosed breathing system for oxygen prebreathing prior to high-altitude exposure or EVA is presented. The breathing system, consisting of a completely enclosed stocking cap type of rubberized head enclosure with oxygen or air supply through an oro-nasal diffuser or a spray bar extending across the upper portion of the face plate, was measured for rates of oxygen flow, breathing resistance, mask pressures and ease and comfort to the wearer over periods of five to seven hours. Results obtained indicate the mask to be adequate in providing oxygen in a

high-altitude environment, characterized by ease of operation and long-term comfort, the provision of oxygen with minimal negative pressure or increased breathing resistance, and no apparent leakage when properly fit. A.L.W.

**A81-22081 An improved oxygen mask for high-altitude protection.** W. Sears, J. Ernsting, R. Krutz, Jr., R. Shaffstall, R. Holden (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), and D. Root (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings*. Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 42, 43.

In a continuing effort to provide nonencumbering short-duration protection at altitudes above 50,000 ft, several studies have been completed using the RAF high-altitude protective ensemble. Recently six samples of the RAF P/Q masks have been modified to be compatible with standard USAF helmets and intercommunication systems. Basic changes included: reducing the microphone impedance from 300 to 7 ohms; a new harness and mask hookup assembly, and a synthetic rather than the natural rubber facepiece. The modified masks have been shown to withstand windblast to 650 knots, with good retention, on a manikin; and the results of preliminary inflight and groundlevel tests of the masks have been very encouraging. The new mask, coupled with a jerkin and g-suit, provides: compatibility with standard USAF life support and intercommunications equipment; nonencumbering high-altitude protection; low-breathing resistance; an increased shelf life; and improved retention during high-g maneuvering. (Author)

**A81-22082 Onboard oxygen generation.** R. L. Miller, K. G. Ikels, and L. J. Luskus (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings*. Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 44-47. 5 refs.

The basic operating characteristics of two systems for the in-flight generation of aviators' breathing gas to replace stored oxygen supplies are discussed in relation to potential applications in Air Force aircraft. Consideration is given to the concepts and realizations of the fluomine system, in which a solid cobalt chelate forms a reversible complex with molecular oxygen which is released at higher temperature, and the molecular sieve system, in which synthetic zeolites selectively absorb nitrogen and most other compounds from the ambient air, thus concentrating the oxygen in the effluent breathing gas. Advantages of simplicity, relatively long chemical lifetime, effective filtration and a built-in dilution mechanism inherent in the molecular sieve concept are pointed out, and it is concluded that molecular sieves are most suitable for fighter, attack, and trainer aircraft with a maximum of three crew. Conversely, the fluomine system appears to scale more easily to larger crew sizes, but suffers from system complexity, a high power penalty and low chemical lifetime. A.L.W.

**A81-22083 Development of an automatic opening lap belt buckle for aircrew restraint systems.** E. D. Kenzie (Irvin Industries Canada, Ltd., Fort Erie, Ontario, Canada). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings*. Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 65-69.

The design of an automatic-opening lap belt buckle currently under development for ejection seat restraint harnesses is presented. The buckle was designed in view of potential problems such as inadvertent release, environmental durability, gas pressure retention, actuation pressure, manual override, operating simplicity, maintainability, durability and reliability to permit both manual and automatic release of the restraint harness. The basic buckle concept is that of a main base ring with the top interior rim providing the latching surface for hook-type harness lugs, with a spool-shaped cover moving up and down in the center of the ring to hold or release the harness lug hooks. Supplementary features include a parachute

arming lanyard key, an automatic parachute arming lanyard key, an override push button, a safety interlock socket, and gas operation of the automatic release. Results of limited tests of prototype units have been found encouraging. A.L.W.

**A81-22084** **New developments in restraint systems.** L. Farris (Pacific Scientific Co., Anaheim, Calif.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings.* Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 70-72.

The development of hardware and theories for aircrew restraint systems for use in current and future high-performance aircraft is discussed. Attention is given to a two-motion lift-lever buckle for lap belt systems, a heavy-duty rotary buckle, a two-motion rotary buckle, a mini rotary buckle with dual inertia lock reels, a gas-operated lift-lever buckle, the use of polyester webbing, a recyclable powered inertia lock reel for command prepositioning the aircrew during adverse maneuvers, limb restraints during ejection, and a dual tension inertia reel. The current need for the development of advanced aircrew restraints for high performance aircraft is emphasized as a means of preventing injury and saving lives. A.L.W.

**A81-22085** **Physiological responses of human subjects wearing thermal protective clothing assemblies in varying environments.** D. C. Johanson, S. M. Reeps, and L. J. SantaMaria (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings.*

Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 77-83.

A group of representative free world anti-exposure suit configurations was selected for a test program designed to evaluate their relative effects on aviator performance in the areas of mobility loss, heat stress, and immersion hypothermia protection. Sequential testing was utilized to eliminate those configurations which did not meet predetermined requirements to satisfy the operational need of naval forces. Mobility loss and heat stress testing at 35 C have been completed. Immersion hypothermia testing in 7.2 C water is currently being conducted with tests in 0 C water to follow. (Author)

**A81-22086** **Effectiveness and wearability of immersion hypothermia protection equipment.** R. M. Harnett, E. M. O'Brien, F. R. Sias (Clemson University, Clemson, S.C.), and J. R. Pruitt (Oconee Memorial Hospital, Seneca, S.C.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings.* Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 84-87. 6 refs. U.S. Department of Transportation Contract No. CG-72074 A.

A wide range of personal equipment for protection from immersion hypothermia was studied through experiments involving human volunteers. Immersion experiments in a tank of refrigerated water revealed the protection effectiveness of each test article. This effectiveness is expressed in terms of estimates of survival time in 35 F water for 'thin, average and heavy' individuals. 'Wearability' was established (through stress testing) in terms of reductions in mobility, heat loading and fatigue induced during selected exercises as compared to similar results obtained while the subjects were wearing nominal clothing. The results indicate clear trade-offs between effectiveness and wearability and provide a basis for informed selections of protection equipment. (Author)

**A81-22092** **Crew station assessment using the Bioman modeling system.** G. D. Frisch (U.S. Naval Aerospace Medical Center, Naval Aerospace Medical Research Laboratory, New Orleans, La.) and L. A. D'Auliero (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: *Survival and Flight Equipment Association, Annual Symposium, 17th, Las Vegas, Nev., December 2-6, 1979, Proceedings.* Canoga Park, Calif., Survival and Flight Equipment Association, 1980, p. 132-137. 9 refs.

The use of the Bioman modeling system in the evaluation of the physical compatibility of crew members with crew stations under emergency egress conditions is demonstrated. The Bioman system, which is comprised of cockpit geometry, occupant anthropometry and gross motion simulation subprograms, was used to evaluate the proposed F-18 crew station, and simulation results were compared with those obtained from track and tower tests using instrumented dummies and physiological acceptance tests using human subjects. Results of the simulations indicated a possible foot-instrument panel contact problem that was confirmed by the dummy and human tests. Further modeling was then undertaken to quantify the severity of the problem, and the simulated acceleration profiles were found to be in good agreement with experimental measurements. As a result of the simulation and the dummy and human tests, the proposed crew station configuration was deemed unacceptable, and modifications to the station, including a dynamic kick plate to prevent foot-instrument panel contact during ejection, were analyzed. A.L.W.

**A81-22105** **Long-term follow-up of lung volume measurements in initially healthy young aviators.** N. R. MacIntyre, R. E. Mitchell, A. Oberman, W. R. Harlan, and A. Graybiel (U.S. Naval Aerospace Medical Center, Naval Aerospace Medical Research Laboratory, Pensacola, Fla., Alabama, University, Birmingham, Ala.). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 1-5. 19 refs.

Lung volume measurements on a large number of initially healthy young military aviators were recorded periodically in follow-up from 1940-69. Vital capacities were measured spirometrically and total lung capacities were measured planimetrically from chest roentgenograms. Residual volumes were calculated by subtracting the vital capacity from the total lung capacity in each subject. Additional variables available for analysis were cigarette smoking histories, family histories, aviation career patterns, pulmonary symptoms, cardiac disease diagnoses, and anthropometric measurements. Multiple linear regression techniques were used on these variables to construct prediction equations for each lung volume in 1969. From these longitudinal analyses, cigarette smoking and pulmonary symptoms were found to be associated with an obstructive lung volume pattern in 1969, while coronary artery disease and weight gain were found to be associated with a restrictive lung volume pattern in 1969. A career in military aviation had no significant association with lung volumes. (Author)

**A81-22106** **Response to transient haemorrhage after acute and chronic section of the carotid sinus nerves.** A. Howe and A. N. Nicholson. *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 11-15. 25 refs.

Adaptation to denervation of the carotid sinus region was studied in cats during hypotension induced by a controlled hemorrhage. After denervation, the fall in arterial pressure in response to hemorrhage was increased, but the partial recovery of blood pressure was preserved. In chronic animals, this pattern of response was also seen, but a resting hypertension developed and ensured that the minimal blood pressure and the recovery reached during the hemorrhage were similar to those of intact animals. The studies suggest that the primary role of the carotid receptors is to minimize the effect of stresses which lead to hypotension, rather than to set the level of the resting blood pressure. (Author)

**A81-22107** **Cardiovascular and biochemical response to simulated space flight entry.** J. R. Hordinsky, U. Gebhardt, H. M. Wegmann, and G. Schafer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 16-18. 7 refs.

Twelve men and 12 women were exposed to two types of short-duration (6 h) space flight entry simulation: bedrest (no head-down tilt) and water immersion (to the neck). Preceding and following the simulation, orthostatic tolerance testing using LBNP



(Lower Body Negative Pressure) was performed. Male LBNP tolerance was greater than female LBNP tolerance at all four comparison points (pre- and post-bedrest, pre- and post-water immersion), whereas the short-duration bedrest reduces female LBNP tolerance about as effectively as water immersion, only water immersion leads to marked LBNP intolerance in the male subjects. If the water immersion model simulates zero G, loss of male and female orthostatic tolerance will be about equal after short-duration space flight. On the other hand, the bedrest simulation would indicate a greater loss of orthostatic tolerance for females. (Author)

**AB1-22108 Dopaminergic agonists and conditioned avoidance response in normoxic or hypoxic rats.** C. Salgaut, N. Moore, J.-L. Leclerc, and F. Boismare (Rouen, Université, Rouen, France). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 19-23, 30 refs.

The actions of four dopaminergic agonists (apomorphine, bromocriptine, amantadine, piribedil) on a conditioned avoidance response were studied in normoxic or hypobaric hypoxic rats. Low doses of agonists have no effects in normoxia, but induce an antihypoxic protection (improvement of learning in hypoxia). In contrast, the higher doses impair learning both in normoxia and hypobaric hypoxia. The possibility of an antihypoxic property induced by dopaminergic post-synaptic receptors stimulation is discussed and seems to be the main phenomenon while action or other nonspecific sites seems to be responsible for the high dose-induced impairment of learning and of resistance to hypoxia. (Author)

**AB1-22109 Postmortem coronary atherosclerosis findings in general aviation accident pilot fatalities - 1975-77.** C. F. Booze, J. K. Pidkowitz, A. W. Davis, and F. A. Bolding (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 24-27, 7 refs.

The autopsies of 764 pilots involved in fatal general aviation accidents during the years 1976-77 were reviewed to appraise the age specific prevalence of coronary atherosclerosis among the autopsied group. Of the pilots killed in aircraft accidents and autopsied during 1975-77, 51% were found to have some degree of coronary atherosclerosis ranging from minimal to severe. However, only about 5% of the autopsied group were categorized as having severe coronary atherosclerosis. The rate per 1,000 of severe coronary atherosclerosis increased with age from 14.5 for ages less than 30, to 89.9 for ages 50 years and above; the rate nearly tripled from ages 30-39 to 40-49 (22.1 to 63.6). The prevalence of coronary atherosclerosis among this group of autopsied airmen is less than would have been expected based on the results of other recent studies. (Author)

**AB1-22110 Effect of body supination angle on subjective response to whole-body vibration.** C. B. Harrah and R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 28-32, 6 refs. Contract No. F33615-79-C-0509.

Three experiments were conducted to evaluate the subjective symptomatology associated with various combinations of supination angle and vibration spectral composition. Sinusoidal, sum-of-sine, and random vibration were used in the first, second, and third experiments, respectively. All exposure periods were 40 s and the supination angle was varied from 13-65 deg. Subjective response was evaluated by means of a physical symptom survey incorporating a discomfort rating scale. For all three experiments, the results indicated a primary effect of supination angle was to shift the vibration-induced sensations across body regions. Small angles (nearly seated upright) were most often associated with stomach, abdomen, and head discomfort; large angles were most often associated with upper back, neck, and sacral discomfort. With respect to the calculated total-body response, results indicated a preference for the 30 deg supination angle for both complex vibration spectrums used and for all three sinusoidal frequencies. This finding

suggests the existence of an optimal supination angle for comfort under vibration. (Author)

**AB1-22111 Brain/computer communication to reduce human error - A perspective.** C. W. Sem-Jacobsen (EEG Research Institute, Oslo, Norway). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 33-37, 10 refs.

Recent developments in physiology and neurophysiology, biomedical monitoring, and micro-processors has made it possible to give the pilot improved electronic support and to increase flight safety. Direct brain/computer communication is a new way to combat human error. Monitoring ECG will give information on the operator's physical and mental load/overload situation as well as on impending cardiac failure. Information presented to the operator will elicit different biological patterns whether the operator is alert and takes the information into his stream of thoughts or not. Together with the reaction time, this will give needed information about the operator's alertness and responsiveness. In the future, with this approach, the computer may know on-line to what extent the operator perceives all the information given, as well as the operator's physical and mental load/overload situation and health. Brain/computer communication should be developed to support key-operating personnel and to reduce human error. (Author)

**AB1-22112 Antidiuretic hormone excretion at high altitude.** M. J. Harber (Kidney Research Unit for Wales Foundation, Institute of Renal Disease, Cardiff, Wales), J. D. Williams (Welsh National School of Medicine, Cardiff, Wales), and J. J. Morton (Medical Research Council, Blood Pressure Unit, Glasgow, Scotland). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 38-40, 15 refs. Research supported by the Kidney Research Unit for Wales Foundation.

Urinary excretion of electrolytes, creatinine, urea, and antidiuretic hormone - measured as arginine vasopressin (AVP) by radioimmunoassay - was investigated in eight Himalayan mountaineers during ascent on foot from 1900-5400 m. Specimens were collected from each individual whenever urine was voided, preserved with 1% boric acid, and subsequently pooled to give samples representative of 24-h collections. AVP was found to be reasonably stable under simulated conditions of storage. In all subjects, the observed AVP excretion rates were mostly in the lower region of the normal range and there was generally no correlation with altitude, urine osmolality, electrolyte excretion, or occurrence of AMS symptoms - even in a fatal case of cerebral oedema. It is concluded that AVP does not play a primary role in the changes in fluid balance which accompany either acclimatization to high altitude or the onset of AMS. (Author)

**AB1-22113 2,3-diphosphoglycerate and night vision.** W. J. Schull, J. Clench, R. E. Ferrell, S. A. Barton (Texas, University, Houston, Tex.), R. I. Goldsmith (Michigan, University, Ann Arbor, Mich.), and F. Rothhammer (Universidad de Chile, Santiago, Chile). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 41-44, 14 refs. Grant No. NIH-19514.

Recovery of night vision at altitude has been examined in relationship to changes in 2,3-diphosphoglycerate (DPG). It appears that, if DPG influences night adaptation, its effect is small. Inter-individual variability is large, both in terms of DPG and performance on the MESOP, the device used to measure dark adaptation. (Author)

**AB1-22114 The physician's determination of personnel reliability in sensitive occupations.** D. K. Kentsmith (Mental Hygiene Clinic, Omaha, Neb.). *Aviation, Space, and Environmental Medicine*, vol. 52, Jan. 1981, p. 45-49, 14 refs.

The Air Force Medical Officer through AFR 35-99 (Personnel Reliability Program) is responsible for the medical evaluation, psychological assessment, and surveillance of persons who will work in sensitive occupations. This paper addresses various personality factors which indicate poor personnel reliability and suggest an interviewing technique of open-ended questions and developmental

history assessment to help determine reliability. Once a person is selected into a Personnel Reliability Program, the physician must be alert to the importance of social stress on personnel reliability and performance. (Author)

**A81-22550** \* The response of a realistic computer model for sitting humans to different types of shocks. H. Mertens and L. Vogt (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Aerodynamischen Widerstand, Cologne, West Germany, Nov. 25, 26, 1980, Paper 17* p. 10 refs.

A mechanical model of the human body in the sitting posture is described. The model parameters were derived from the results of steady state vibration experiments conducted under various levels of static acceleration up to +4 Gz. The resulting nonlinear behavior of the human body was modeled by calculating the characteristics of the model elements. To investigate the model's response under impact loads, the characteristics of the elements were extrapolated beyond 4 G. The results show that the model is able to predict the forces in the vertebral column for arbitrary input pulse shapes. The fact that a rectangular acceleration pulse of 20 Gz causes spinal injuries could be demonstrated by the response of the model. (Author)

**A81-22610** \* Advanced control techniques for teleoperation in earth orbit. A. K. Bejczy and T. L. Brooks (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Association for Unmanned Vehicle Systems, Annual Technical Symposium, 7th, Dayton, Ohio, June 16-18, 1980, Proceedings.

Dayton, Ohio, Association for Unmanned Vehicle Systems, 1980, p. 59-74. 23 refs. Contracts No. NAS7-100, No. N00014-77-C-0256.

Emerging teleoperation tasks in space invite advancements in teleoperator control technology. This paper briefly summarizes the generic issues related to earth orbital applications of teleoperators, and describes teleoperator control technology development work including visual and non-visual sensors and displays, kinesthetic feedback and computer-aided controls. Performance experiments were carried out using sensor and computer aided controls with promising results which are briefly summarized. (Author)

**A81-23092** Histochemical study of lipid-like material in photochemically formed jeewanu, the protocell, with formaldehyde partially replaced by other organic sources. K. Bahadur and P. K. Varma (Allahabad University, Allahabad, India). *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Mar. 1981, p. 100-102. 14 refs.

**A81-23093** Hominid evolution and SETI. E. J. Coffey. *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Mar. 1981, p. 107-114. 30 refs.

Various preconceptions about human origins and the character of the processes of thinking are shown to be misleading. The extent of the relationship between perceiving and thinking is revealed. It is shown that understanding human evolution requires consideration of human biological adaptations, rather than any supposed human uniqueness. Evidence from various sources is shown to be consistent with the notion of man as a neotenus ape. Bipedalism is shown to be the basic hominid adaptation, and a necessary precondition for the emergence of both technology and language. Hominid evolution is shown to have involved two stages. On the basis of these, the concept of the parallel evolution of intelligence, and the possibility of emergence of creatures with a human-like behavioral capacity, are considered. The unlikelihood of either is indicated. (Author)

**A81-23097** The effect of expectations on slow oculomotor control. III - Guessing unpredictable target displacements. E. Kowler (New York University, New York, N.Y.) and R. M. Steinman (Maryland, University, College Park, Md.). *Vision Research*, vol. 21,

no. 2, 1981, p. 191-203. 15 refs. NSF Grant No. BNS 77-16474.

Previously, we had shown that expectations about the direction of future target motion produce involuntary anticipatory smooth eye movements in the direction of the expected target motion (Kowler and Steinman, 1979). The present experiments extend these results to expected target motions in unpredictable directions. Subjects showed anticipatory smooth eye movements while tracking an unfamiliar pattern of right- and left-going target steps while they were guessing the direction of the expected steps. Eye velocity increased when subjects became certain that they knew what the pattern was. Guesses also produced anticipatory smooth eye movements for both expected target steps and ramps in one of 12 unknown directions. Anticipatory smooth eye movements produced by guesses and by certain knowledge of target direction were not affected when subjects performed a distracting task (mental arithmetic). These results show that the effect of expectations on slow eye movements cannot be removed simply by making target motions unpredictable. Models of the slow oculomotor subsystems, to be complete, require development of techniques to predict the direction and certainty of human expectations about unpredictable patterns of target motion. A technique, which may serve this purpose, is described. (Author)

**A81-23098** Displacement detection in human vision. G. E. Legge (Minnesota, University, Minneapolis, Minn.) and F. W. Campbell (Cambridge University, Cambridge, England). *Vision Research*, vol. 21, no. 2, 1981, p. 205-213. 46 refs.

The displacement threshold is defined to be the smallest instantaneous target displacement that can be detected. Properties of the displacement threshold for a small, luminous spot were measured psychophysically. In a structureless field the displacement threshold was near 1.5 arcmin subject to individual variation. The effects of pattern were studied by measuring displacement thresholds at the centers of a set of annuli ranging from 2.85-728 arcmin in diameter. Displacement thresholds were reduced by the presence of the annuli and were as low as 0.3 arcmin. This threshold reduction could not be fully attributed to processes of relative spatial localization because displacement thresholds were lower than spatial localization thresholds for annulus diameters greater than 20 arcmin. The displacement threshold is virtually independent of orientation and pupil size. It increased about 75% with a three log unit decrease in photopic target luminance. Displacement detection appears to depend upon the motion sense rather than the position sense. It may be limited by fixation accuracy. (Author)

**A81-23099** Direction-specific and position-specific effects upon detection of displacements during saccadic eye movements. S. Heywood and J. Churcher (Warwick, University, Coventry, England). *Vision Research*, vol. 21, no. 2, 1981, p. 255-261. 15 refs. Medical Research Council Grant No. G976/154/N.



# STAR ENTRIES

**N81-16717** California Univ. Berkeley  
**NEUROENDOCRINE STRATEGIES FOR ADAPTATION TO HIGH ALTITUDE** Ph.D. Thesis  
 Susan Fong Akana 1980 145 p  
 Avail. Univ. Microfilms Order No 8029309

Some of the neuroendocrine adaptations which occur in rats after exposure to high altitude are addressed, particularly the responses of the adrenal cortex and their relation to certain aspects of central and peripheral neurotransmitter metabolism. Whether the enhancement of tyrosine hydroxylase activity which occurs in rats at high altitude in select regions of the brain and in the adrenal gland is induced by high levels of corticosterone was experimentally investigated. Major results confirm an increase in tyrosine hydroxylase in the brain and adrenal gland and an increase in corticosterone levels in the juvenile rat developing at high altitude as compared to the young sea level controls. When the adrenocortical function was depressed by administration of metyrapone, both at sea level and high altitude, tyrosine hydroxylase activity remained unchanged. It is suggested from the data that the increase in adrenocortical function and the increase in tyrosine hydroxylase activity in brain and adrenal gland of rats born and maintained at high altitude are two interdependent adaptations to the hypoxic environment.

Dissert. Abstr.

**N81-16718\*** National Aeronautics and Space Administration, Washington, D. C.  
**LIFE OF THE ONION NOT KNOWING UP FROM DOWN**  
 A. Gordeyev Aug 1980 9 p refs. Transl. into ENGLISH from Znaeye - Sila, (USSR), v. 12, no. 630, Dec. 1979 p 9-10. Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASw-3199)  
 (NASA-TM-76353) Avail. NTIS HC A02/MF A01 CSCL 06C

The absence of the force of gravity has a negative effect on plant life. Plants grown on spacecraft have died prematurely. Tests are being made to discover whether or not electricity will compensate for the absence of gravitation. It was found that an onion under current is not subject to the force of gravity. Tremendous possibilities are opened up by these experiments.

Author

**N81-16719\*** National Aeronautics and Space Administration, Washington, D. C.  
**HEMORHEOLOGICAL CHANGES, THE STATE OF MICRO-CIRCULATION, AND BLOOD ACID-BASE BALANCE IN RATS UNDER CONDITIONS OF A 30-DAY LIMITING OF THE MOTOR ACTIVITY**  
 Yu. M. Shtykhnov and V. I. Udovichenko Dec. 1980 8 p refs. Transl. into ENGLISH from Vestn. Akad. Med. Nauk, SSSR (USSR), no. 2, 1978 p 68-71. Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of General Pathology and Pathological Physiology of the Akademii Meditsinskikh Nauk, Moscow (Contract NASw-3198)  
 (NASA-TM-76464) Avail. NTIS HC A02/MF A01 CSCL 06S

Changes were expressed in reduction in number of true capillaries, the appearance of nonfunctioning empty vessels and in the opening of the arteriole-venular shunts. Changes in the acid-base balance in the direction of reduction of buffer blood content were also noted.

T.M.

**N81-16720** Utah Univ., Salt Lake City  
**CARDIORESPIRATORY AND PERCEPTUAL RECOVERY FROM A MARATHON RUN BY NOVICE AND EXPERIENCED WOMEN MARATHON RUNNERS** Ph.D. Thesis  
 Carol Lynette Christensen 1980 133 p  
 Avail. Univ. Microfilms Order No 8101001

Subjects performed tests of maximum oxygen consumption (VO2max), 7-9 days before, and 15-16 days after a marathon. They also completed four 30 minute runs on the treadmill at their planned race pace, 6-7 days before, and 2-3 days, 6-7 days, and 13-14 days after the marathon. The five novice and eight experienced women marathon runners who served as subjects in the second experiment, performed VO2max tests 8-11 days before, and 7-9 days after a marathon held approximately 5 months after the first experiment. Cardiorespiratory and perceptual parameters do not appear to be decremented by a marathon run nor does marathon running experience appear to affect the time-course of recovery of these parameters. Other factors, such as stiffness, soreness, motivation, and biochemical indices may recover more slowly, but are apparently not reflected in the gross metabolic response to exercise or feelings of exertion following a marathon run.

Dissert. Abstr.

**N81-16721** Washington Univ., Seattle  
**PRESSURE-FLOW HYSTERESIS IN THE PULMONARY VASCULATURE** Ph.D. Thesis  
 Kenneth Charles Beck 1980 94 p  
 Avail. Univ. Microfilms Order No 8029733

Pulmonary vessels are composed of soft tissue that contains smooth muscle, and are embedded in the soft tissue of lung parenchyma. Both vascular tissue and pulmonary parenchyma were shown to be hysteretic, i.e., the tissues do not have a unique length-tension or pressure-volume relationship, their mechanical properties depending strongly on stress history. Therefore, the pulmonary vascular bed as a whole should not have a unique pressure-volume relationship. Furthermore, vascular resistance should also be history-dependent, in a way that ought to parallel pressure-volume hysteresis. Pressure-flow hysteresis was studied by fixing outflow pressure (P sub pv) and cycling flow (Q) while measuring inflow pressure (P sub pa) and fixing Q and cycling P sub pv while measuring P sub pa. Vascular volume changes were estimated from changes in the perfusion circuit reservoir.

Dissert. Abstr.

**N81-16722\*** National Aeronautics and Space Administration, Washington, D. C.  
**ANTIBODIES TO MYOFIBRIL ANTIGENS IN COSMONAUTS AFTER SPACEFLIGHTS**  
 R. Yu. Tashpulatov, T. A. Danilova, A. T. Lesnyak, V. I. Legenkov, V. S. Znamenskiy, and Ye. Yu. Dedyuyeva Aug 1980 8 p refs. Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. Immunobiol. (USSR), no. 12, Dec. 1979 p 36-39. Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Moscow Gamalei Inst. for Epidemiology and Microbiol. (Contract NASw-3199)  
 (NASA-TM-76300) Avail. NTIS HC A02/MF A01 CSCL 06P

Serum samples obtained from 15 astronauts before and after spaceflights were studied with the use of the indirect immunofluorescent method. In seven astronauts antibodies to different elements of the human heart muscle appeared after flights. Strong and very strong luminescence of the elements of heart muscle tissue was detected in the astronauts after the third space flight. In a study of the sera on sections of bovine heart muscle tissue the reactions of the sera taken before and after flight were found to show no essential differences.

E.D.K.

**N81-16723\*** National Aeronautics and Space Administration, Washington, D. C.  
**WAYS OF INCREASING MUSCULAR ACTIVITY BY MEANS OF ISOMETRIC MUSCULAR EXERTION**  
 A. V. Kovalik Aug 1980 9 p refs. Transl. into ENGLISH from Teor. i Prakt. Fizicheskoy Kultury (USSR), no. 12, Dec. 1979 p 38-40. Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Penza Factory Higher to Technical

Inst., USSR

(Contract NASw-3199)

(NASA-TM-76307) Avail: NTIS HC A02/MF A01 CSCL 06P

The effect of isometric muscular exertion on the human body was investigated by having subjects perform basic movements in a sitting position in the conventional manner with additional muscle tension at 50% maximum force and at maximum force. The pulse, arterial pressure, skin temperature, respiratory rate, minute respiratory volume and electrical activity of the muscles involved were all measured. Performance of the exercises with maximum muscular exertion for 20 sec and without movement resulted in the greatest shifts in these indices; in the conventional manner substantial changes did not occur; and with isometric muscular exertion with 50% maximum force with and without movement, optimal functional shifts resulted. The latter is recommended for use in industrial exercises for the prevention of hypodynamia. Ten exercises are suggested. E D K.

**N81-16724\*** National Aeronautics and Space Administration, Washington, D. C.

**PHARMACOLOGICAL ACTIVITY AND TOXICITY OF SOME NEUROTROPIC AGENTS UNDER CONDITIONS OF EXPERIMENTAL HYPODYNAMIA**

L. T. Kirichuk Sep. 1980 8 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 42, no. 3, May - Jun. 1979 p 221-225 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Kharkov Medical Inst. (USSR)

(Contract NASw-3199)

(NASA-TM-76371) Avail: NTIS HC A02/MF A01 CSCL 06T

The indices of pharmacological range, risk coefficients, ED50, LD50, the size of the area of toxic activity, and maximal tolerated and absolute lethal doses were compared in hypodynamic mice. The pharmacological activity of the test neurotropic agents exhibiting a central action underwent change, but their toxicity remained unchanged. T.M.

**N81-16725\*** National Aeronautics and Space Administration, Washington, D. C.

**AUTOREGULATION OF CEREBRAL BLOOD CIRCULATION UNDER ORTHOSTATIC TESTS**

M. D. Gayevyy, V. G. Maltsev, and V. E. Pogorelyy Sep. 1980 10 p refs Transl. into ENGLISH from Fiz. Zh. SSR (USSR), v. 65, no. 2, 1979 p 263-268 Original language document announced as A79-36098 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Pyatogorsk Pharmaceutical Inst., USSR

(Contract NASw-3199)

(NASA-TM-76372) Avail: NTIS HC A02/MF A01 CSCL 06P

Autoregulation of cerebral blood flow (ACBF) under orthostatic tests (OT) was estimated in acute experiments on rabbits and cats under local anesthesia according to changes of perfusion pressure (PP) in carotid arteries, cerebral blood flow, pressure in the venous system of the brain, and resistance of cerebral vessels. The OT were conducted by turning a special table with the animal fastened to it from a horizontal to a vertical (head up or head down) position at 40 to 80 deg. In most experiments ACBF correlated with the changes of PP. Different variations of ACBF and its possible mechanisms are discussed. E D K.

**N81-16726\*** National Aeronautics and Space Administration, Washington, D. C.

**EFFECT OF CERVICOLABYRINTHINE IMPULSION ON THE SPINAL REFLEX APPARATUS**

A. I. Yarotskiy Sep. 1980 7 p refs Transl. into ENGLISH of Fiziol. Zh. SSSR (USSR), v. 75, no. 12, Dec. 1979 p 1838-1840 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Uzbek Inst. for Physical Culture, Tashkent, USSR (Contract NASw-3199)

(NASA-TM-76375) Avail: NTIS HC A02/MF A01 CSCL 06P

In view of the fact that the convergence effect of vestibular impulsion may both stimulate and inhibit intra and intersystemic

coordination of physiological processes, an attempt was made to define the physiological effect on the spinal reflex apparatus of the convergence of cervicolabyrinthine impulsion on a model of the unconditioned motor reflex as a mechanism of the common final pathway conditioning the formation and realization of a focused beneficial result of human motor activities. More than 100 persons subjected to rolling effect and angular acceleration during complexly coordinated muscular loading were divided according to typical variants of the functional structure of the patella reflex in an experiment requiring 30 rapid counterclockwise head revolutions at 2/sec with synchronous recording of a 20 item series of patella reflex acts. A knee jerk coefficient was used in calculations. In 85 percent of the cases 2 patellar reflexograms show typical braking and release of knee reflex and 1 shows an extreme local variant. The diagnostic and prognostic value of these tests is suggested for determining adaptive possibilities of functional systems in respect to acceleration and proprioceptive stimuli. T.M.

**N81-16727\*** National Aeronautics and Space Administration, Washington, D. C.

**RHEOENCEPHALOGRAPHY IN MENIERE'S DISEASE**

M. P. Nikolayev and O. N. Mertsalova Sep. 1980 7 p refs Transl. into ENGLISH from Vestn. Otorinolaringol. (USSR), no. 3, May-Jun. 1979 p 12-15 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Botkin Clinical Hospital

(Contract NASw-3199)

(NASA-TM-76387) Avail: NTIS HC A02/MF A01 CSCL 06E

Rheoencephalography (REG) was used on 35 patients with Meniere's disease to determine tonus and perfusion of cerebral vessels. The analysis took account of age, duration of the disease and presence or absence of cervical osteochondrosis. Hypertensive symptoms in the vertebro-basilar system predominated in the under 45 age group, while for the over 45 patients and those suffering for more than 5 years, hypertensive symptoms were likewise noted in the internal carotid arterial system. Signs of angiospasm were revealed both for patients with cervical osteochondrosis and without it. Hypertensive signs were noted in 88.5% of patients with Meniere's disease and as a rule they were noted in the entire vertebro-basilar system without respect to the presence or absence of concurrent cervical osteochondrosis and uni- or bilateral affection of the labyrinth; in patients over 45 who had suffered more than 5 years this also applied to the internal carotid arterial system. Identification of the condition of cerebral circulation and the planning of more effective therapy that influences vascular tone is made possible by REG. E D K.

**N81-16728\*** National Aeronautics and Space Administration, Washington, D. C.

**HYDROELASTIC EFFECTS IN THE AORTA BIFURCATION ZONE**

A. S. Volmir, M. S. Gersheyn, and B. A. Purinya Oct. 1980 7 p refs Transl. into ENGLISH of Mekh. Polim. (USSR), v. 7, Jan. - Feb. 1971 p 164-165 Original language document announced as A71-28657 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. Prep. by Latvian SSR Acad. of Sci., USSR

(Contract NASw-3199)

(NASA-TM-75432) Avail: NTIS HC A02/MF A01 CSCL 06P

The mechanical behavior of the vessels and blood is mathematically analyzed at the point of aortic bifurcation using a homogeneous single layer channel as a model of the aorta. Allowance is made for the fact that the aortic intima is considerably less rigid than the other layers. For analysis of blood flow in the major arteries, the blood is treated as a viscous Newtonian fluid whose movements are described by Navier-Stokes equations and a continuity equation. Blood flow dynamics at the aortic bifurcation are discussed on the basis of the results.

E D K.

**N81-16729\*** National Aeronautics and Space Administration, Washington, D. C.

**ORTHOSTATIC HYPOTENSION**

J. J. Grimm Dec. 1980 11 p refs Transl. into ENGLISH of Rev. Suisse de Medecine (Switzerland), 69, no. 16, 1980 p 518-521 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Univ. Med. Policlinic, Lausanne, Switzerland  
(Contract NASw-3199)  
(NASA-TM-75433) Avail: NTIS HC A02/MF A01 CSCL 065

Following a brief physiopathological review, orthostatic hypotension is classified into three groups: organic, functional and medication-dependent. The importance of etiological diagnosis, the use of objective tests and appropriate therapy, especially concerning the organic forms, is stressed. Author

**N81-16730\*** National Aeronautics and Space Administration, Washington, D. C.

**DOSIMETRIC INVESTIGATIONS OF COSMIC RADIATION ABOARD THE KOSMOS-936 AES (JOINT SOVIET-AMERICAN EXPERIMENT K-206)**

E. V. Benton, Ye. Ye. Kovalyev, and V. Ye. Dudkin Apr. 1980 90 p refs Transl. into ENGLISH of "Dozimetricheskiye Issledovaniya Kosmicheskikh Izlucheni na Bortu ISZ Kosmos-936 (Sovmestnyy Sovetsko-Amerikanskyy Eksperiment K-206)" Moscow, 1979 124 p Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Medico-Biological Problems, Ministry of Health, Moscow  
(Contract NASw-3199)  
(NASA-TM-75772) Avail: NTIS HC A05/MF A01 CSCL 06R

The Soviet and American parts of the experiment are described separately. Particular attention was given to the following problems: placement of the detectors; study of neutron radiation within the biosatellite; and studies of fragmentation of heavy nuclei on accelerators. Unified methods were developed for the calibration of Soviet and American detectors. T.M.

**N81-16731\*** Tennessee Univ., Memphis.

**RELATIVE TOXICITY TESTING OF SPACECRAFT MATERIALS. 1: SPACECRAFT MATERIALS Annual Report, 10 Nov. 1978 - 9 Nov. 1980**

W. H. Lawrence 6 Nov. 1980 83 p refs  
(Contract NAS9-15670)  
(NASA-CR-160908) Avail: NTIS HC A05/MF A01 CSCL 06T

In chamber thermodegradation procedures were used to access the lethality to rats of the pyrolysis/combustion products of three foams, an adhesive backed metallic tape and RTV silicone rubber adhesive sealant used in spacecraft construction. The role of carbon monoxide in the overall pyrolysis toxicity was also investigated. Post exposure observation of the rats, histological evaluation of selected organs, carbon monoxide concentration in the chamber atmosphere during exposure and the percent carboxyhemoglobin in the animals expiring in the chamber are discussed. Thermogravimetric analysis and dosage response results are given. The lethal effect of the RTV silicon appears to be due to physical obstruction of the respiratory system by particulate matter from pyrolysis. A.R.H.

**N81-16732\*** Tennessee Univ., Memphis.

**RELATIVE TOXICITY TESTING OF SPACECRAFT MATERIALS. 2: AIRCRAFT MATERIALS Annual Report, 10 Nov. 1978 - 9 Nov. 1980**

W. H. Lawrence 6 Nov. 1980 111 p refs  
(Contract NAS9-15670)  
(NASA-CR-160907) Avail: NTIS HC A06/MF A01 CSCL 06T

The relative toxicity of thermodegradation (pyrolysis/combustion) products of aircraft materials was studied. Two approaches were taken to assess the biological activity of the pyrolysis/combustion products of these materials: (1) determine the acute lethality to rats from inhalation of these pyrolysates and (2) examine the tendency for sublethal exposure to the pyrolysates to disrupt behavioral (shock avoidance) performance of exposed rats. The relative importance of lethality vs. behavioral

effects in selection of a material may be dictated by whether or not individuals potentially exposed to such products, would have an opportunity to escape if they were behaviorally capable of doing so. If so, the second parameter would assume greater importance, but if not the first parameter may be of much greater importance in selecting materials. E.D.K.

**N81-16733\*** McDonnell-Douglas Astronautics Co., St. Louis, Mo. Engineering Psychology Dept.  
**DYNAMIC TARGET ACQUISITION: EMPIRICAL MODELS OF OPERATOR PERFORMANCE Final Report, Jul. 1977 - Jun. 1980**

Larry R. Beideman, Frank E. Gomer, and Sheldon H. Levine Aug. 1980 221 p refs  
(Contract F49620-77-C-0100, AF Proj. 2313)  
(AD-A092263; MDC-E2305; AFOSR-80-1177TR) Avail: NTIS HC A10/MF A01 CSCL 17/8

The intent of this three year research program has been to evaluate detection and recognition processes as observers view dynamic sensor imagery for target acquisition purposes. Moreover, we have attempted to specify differences in human performance which can be attributed to inherent differences between IR and TV target signatures. In all experiments, we have emulated the image dynamics associated with a ground-stabilized, narrow FOV sensor. Further, we have used experienced observers as subjects in these experiments. The operational characteristics of certain attack aircraft and imaging missiles led us to examine initial slant ranges to target of 30,000, 15,000, and 5,000 ft. Comparisons of operator performance with simulated IR vs. TV imagery at all initial slant ranges indicated that IR targets were detected more quickly and at greater stand-off ranges than comparable TV targets, especially when targets were embedded in background scenes of medium or high complexity. This occurred even though we simulated optimal visibility conditions, with no significant atmospheric attenuation or distortion of the energy received by the imaging sensor. GRA

**N81-16734\*** Civil Aeromedical Inst., Oklahoma City, Okla.  
**EFFECTS OF OZONE (0.30 PARTS PER MILLION, APPROXIMATELY 800 MU G/M<sup>3</sup>) ON SEDENTARY MEN REPRESENTATIVE OF AIRLINE PASSENGERS AND COCKPIT CREWMEMBERS**

E. A. Higgins, M. T. Lategola, C. E. Melton, and J. A. Vaughan Mar. 1980 54 p refs  
(AD-A092268; FAA-AM-80-9) Avail: NTIS HC A04/MF A01 CSCL 01/2

This study was undertaken to determine the effects of 0.30 ppmv ozone on 40 men representative of airline pilots. All were medically fit; 20 were smokers and 20 were nonsmokers. Subjects were divided into two age groups, 40-49 years and 50-59 years. The experiments consisted of exposure to 0.30 ppmv ozone and, on another occasion, to air only for 3 h at a simulated altitude of 6,000 ft mean sea level. Subjects were sedentary throughout the experiment. Ozone had no effect on heart rate and short-term memory. The group showed a statistically significant incidence of symptoms related to ozone exposure, most were shown by the 40 to 49 year old nonsmoking group while at altitude and postaltitude, and in smokers in the 50 to 59 year age group only at altitude. Eye irritation was the commonest symptom, followed by headache, nasal irritation, and throat irritation. Data showed significant effects of ozone on forced expiratory volume, 1 second forced expiratory volume, and forced end-expiratory flow. The pulmonary effect of ozone appears to be principally on the small airways. Impairment of visual accommodation was associated with ozone. Dark adaptation threshold was elevated in ozone in the 50 to 59 year nonsmoking age group. Retinal bleach recovery time was retarded and blink rate was higher during ozone exposure. It is concluded that 0.30 ppmv ozone is near threshold for adverse effects of ozone. The data are also applicable to passengers who fit into the same category as these sedentary subjects. GRA

**N81-16735\*** School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.  
**EVALUATION OF SIMULATED RADIOFREQUENCY HEAT-**



**ING PROCEDURES Interim Report, 1 Jul. 1978 - 1 Jun. 1979**

John C. Burr, Jerome H. Krupp, Doris A. Hamill, and Mary E. Donahue Oct. 1980 28 p refs  
(AF Proj. 7757)

(AD-A092731, SAM TR-80-30) Avail NTIS  
HC A03/MF A01 CSCL 06/16

A method for simulating radiofrequency radiation (RFR) heating at 1.2 GHz E-field oriented in the rat using warm moist (90% relative humidity) air is presented. The method can adequately simulate the overall linear rate of internal heating in the rate and the peak temperature excursion but fails to simulate the initial rapid rate of temperature rise due to RFR. Even with this shortcoming it appears that this moist heat simulation is superior to previous hot air simulations. GRA

**N81-16738# New York Univ., N. Y. Neuromagnetism Lab. MAGNETIC FIELDS OF THE CEREBRAL CORTEX**

Samuel J. Williamson and Lloyd Kaufman 15 Jun. 1980 51 p refs Submitted for publication

(Contract N00014-76-C-0588; NR Proj. 201-209)

(AD A086288, Rept-6) Avail NTIS HC A04/MF A01 CSCL 06/16

The observed patterns over the scalp of magnetic fields evoked by visual, somatic, and auditory stimuli are analyzed to deduce the position and depth of the equivalent current dipole generating source. Expressions are developed for both sphere and half space models for the head, and graphs are presented to correct for the use of a pickup coil of finite diameter. For all three responses, the position of the generating source is deduced to lie in the corresponding primary projection area of the cortex. GRA

**N81-16737# Saint Elizabeth's Hospital, Brighton, Mass. DEVELOPMENT OF PERCUTANEOUS ENERGY TRANSMISSION SYSTEMS Annual Progress Report, Apr. 1979 - Mar. 1980**

Benedict D. T. Daly, Michael Szycher, Michael Worthington, Victor L. Poirier, Roger G. Warren, Christian C. Haudenschild, Michael B. Lewis, Charles E. Scheller, Jon N. Meliones, and Donald Demsey 11 Jun. 1980 290 p refs  
(Contract N01-HV-8-2919)

(PB81-109381, NIH-N01-HV-8-2919-2) Avail NTIS  
HC A13/MF A01 CSCL 06B

A system designed to transmit energy to intracorporeal blood pumps was developed. This system utilized polytetrafluoroethylene (PTFE) to provide a connective tissue biomaterial seal limiting epidermal migration and sinus formation. Eight iterations were evaluated in vivo. These studies have demonstrated that PTFE will support ingrowth and that this ingrowth limits epidermal migration. The interface is protected by a polyester velour covered skirt which provides strain relief and this must be implanted subdermally. Mobility of the tissues surrounding the device is important to allow displacement which provides additional strain relief. A semiquantitative swab culture technique predicts incipient infection. Nutritional deprivation adversely affects biomaterial tissue interactions. GRA

**N81-16738# California Univ., San Diego Center for Human Information Processing****ERRORS IN HUMAN PERFORMANCE Final Report, 1 Jun. 1979 - 31 May 1980**

Donald A. Norman 15 Aug. 1980 50 p refs  
(Contract N00014-79-C-0515, ARPA Order 3767; NR Proj. 157-434)

(AD-A091925, Rept-8004) Avail NTIS HC A03/MF A01 CSCL 05/8

Work on this contract examined various applications of human information processing, focusing on the analysis of human error. As a result of the contract investigations, several areas of potential application were identified. One area of immediate possible application is in the design of human-machine interfaces, with particular concern for aspects of system design that lead to human error, taking into account what is known about human attentional and short-term memory limitations. The major focus of the research effort was devoted to the study of human error

especially those made by highly skilled operators in complex, high-demand systems. A classification scheme for these errors was developed. GRA

**N81-16739# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)****TECHNICAL EVALUATION REPORT OF THE AEROSPACE MEDICAL PANEL WORKING GROUP WG-08 ON EVALUATION OF METHODS TO ASSESS WORKLOAD**

Bryce O. Hartman (USAF School of Aerospace Medicine, Brooks AFB Tex.) Nov. 1980 21 p

(AGARD-AR-139, ISBN-92-835-1374-6) Avail NTIS  
HC A02/MF A01

Military aircraft are becoming increasingly complex the associated avionics systems more sophisticated and the mission profiles more demanding. The problem is to establish if such an increase in aircrew workload has become a limiting factor in the operational employment of some aircraft and to select viable methods to assess it. This companion document to 'Survey of Methods to Assess Workload' sets forth conclusions on workload measurement methodology. SF

**N81-16740# Acurex Corp., Mountain View, Calif. Aerospace Systems Div.****FURTHER STUDY FOR FABRICATION, EVALUATION, AND TESTING OF MONOLAYER WOVEN MATERIALS FOR SPACE SUIT INSULATION Final Report**

Robert Short Sep. 1980 12 p  
(Contract NAS2-10542, Acurex Proj. 6246)

(NASA-CR-166140, ACUREX-TR-80-31/AS) Avail NTIS  
HC A02/MF A01 CSCL 06K

Improvements to the monolayer woven pile concept were evaluated in terms of increased durability and thermal performance. Three varieties of the monolayer material were tested for thermal conductance under various conditions simulating those which occur in space. In addition, the tendency of the pile to unravel was subjectively evaluated. E D K

**N81-16741# Vought Corp., Dallas, Tex.****DEVELOPMENT AND FABRICATION OF AN ADVANCED LIQUID COOLING GARMENT Final Report**

C. W. Hixon 6 Mar. 1978 87 p  
(Contract NAS2-9026)

(NASA-CR-152101, Rept-2-53200/8R-3462) Avail NTIS  
HC A05/MF A01 CSCL 06G

A tube/fin concept liquid cooling garment head cooler was developed, fabricated and delivered to NASA-ARC. The head cooler was fabricated from polyurethane film which sandwiches the transport fluid tubing and a thermally conductive fin material. The head cooler garment is sewn to form a skull cap and covered with a comfort liner. In addition, two Neonate heating garments were fabricated and supplied to NASA for further finishing and use in medical tests. The resulting garment is flexible, elastic and conforms to the head comfortably. Tests on a tube/fin element of identical construction as the head cooler demonstrated good thermal effectiveness. Use of commercially available materials and development of relatively simple fabrication techniques give the potential for a low garment cost. Author

**N81-16742# Boeing Aerospace Co., Seattle, Wash. Engineering Technology Div.****NAVY MANAGER'S GUIDE FOR THE DESIGN SECTIONS OF MIL-H-46855 Final Report, 27 Sep. 1979 - 28 Sep. 1980**

Mildred English 26 Sep. 1980 70 p refs  
(Contract N62269-79-R-0740)

(AD-A092009, D180-26111-1, NADC-79219-60) Avail NTIS  
HC A04/MF A01 CSCL 05/5

This document explains how to implement the design sections of MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment and Facilities. It was written for Navy and contractor Human Factors Engineering (HFE) managers. DoD and Navy requirements for performing HFE design during system acquisition are cited. Eight standard HFE design techniques and 9 design techniques using computers are described. When and

how techniques are used, their products and purpose, and advantages and limitations are explained. GRA

**N81-16743#** Virginia Polytechnic Inst and State Univ., Blacksburg. Human Factors Lab.

**HUMAN VISUAL PERFORMANCE AND FLAT PANEL DISPLAY IMAGE QUALITY**

Harry L. Snyder Jul. 1980 463 p refs  
(Contract N00014-78-C-0238; NR Proj. 196-155)  
(AD-A092685; VPI-HFL-80-1/ONR-80-1) Avail: NTIS  
HC A20/MF A01 CSCL 05/5

This is the Final Technical Report of Task I. Human Engineering Survey and Analysis of the subject contract. The task is a survey of the pertinent visual performance, display system capability, and human engineering design requirements for flat panel visual displays, as applied to U.S. Navy Airborne, Shipborne, and Land-Based Systems. The report contains two application examples of the selection of flat panel displays for both airborne and ship-based information systems. It also surveys the current state-of-the-art of flat panel display technologies, and the manner by which existing visual performance and theory can be applied to the selection and evaluation of flat panel technologies for various applications. The flat panel technologies surveyed are light emitting diodes, electroluminescence, liquid crystal, electrochromic, electrophoretic, and gas (plasma) discharge. A uniform set of performance variables is used to compare the various technologies, both among themselves and with the traditional cathode ray tube. Similarly, these technologies are evaluated against design criteria and current models of image quality which relate human performance to display characteristics. Pertinent human visual performance data are presented as the basis for selecting and applying image quality models. Data gaps and needs are summarized at the end of the report. GRA

**N81-16744#** Massachusetts Inst of Tech., Cambridge. Sea Grant Coll. Program.

**AN ASSESSMENT OF UNDERSEA TELEOPERATORS**

Thomas Nico Sofyanos and Thomas B. Sheridan Jun. 1980 316 p refs  
(Grant NOAA-79AA-D-00101)  
(PB81-102535; MITSG-80-11; NOAA-80082504) Avail: NTIS  
HC A14/MF A01 CSCL 13J

The current and near future applications of undersea teleoperators and competing modes of underwater intervention are assessed. It identifies the role of remotely operated vehicle systems and the implications on diving safety and underwater inspection of offshore installations. The current development trends for teleoperator systems are examined and federally supported programs are evaluated. GRA

**N81-17681#** California Univ., Irvine. Dept. of Developmental and Cell Biology.

**DEVELOPMENT OF QUAYULE (PARTHENIUM ARGENTATUM) RESEARCH IN CELL CULTURE** Final Report

Ernest A. Ball 1 Jan. 1981 14 p refs Prepared for JPL  
(Contracts NAS7-100; JPL-954955)  
(NASA-CR-163945; UCI-59913) Avail: NTIS  
HC A02/MF A01 CSCL 06C

Utilizing the lateral buds of known high rubber producing plants as explants in culture medium specifically designed to engender shoot development and to prevent callus formation, unlimited numbers of replicate plants can be produced. Each has the same genotype as the parent. This procedure has long been used to rid plants of virus, the latter generally does not occur in the embryonic tissues of the bud; it also, by virtue of its axenic nature, eliminates all microorganisms characteristic of the parent plant. Auxins were found essential to callus formation, but since the latter is known to bring about chromosomal aberrations, it was avoided. The cytokinin benzylaminopurine strongly stimulated shoot growth, and the number of regenerated buds on the inoculum was proportional to its concentration. These buds produced shoots several centimeters in length which were caused to root on medium containing indolebutyric acid. Transferred to the septic condition of soil, the plantlets were gradually brought into full sunlight where they showed a brief

vegetative growth with production of mature leaves, and flowered. Author

**N81-17682#** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**USE OF AN ELECTRICAL RESISTANCE HYGROMETER TO MEASURE HUMAN SWEAT RATES**

Toshiyuki Suga Oct. 1980 30 p refs  
(NASA-TM-81223; A-8306) Avail: NTIS HC A03/MF A01 CSCL 06P

The application of the resistance hygrometer as a tool to measure the localized sweat rate from the human body in both the active and passive sweat regions was studied. It was found that the physiological function of the skin membrane and fluid carrier transport phenomena from the outer skin have an indistinguishable effect on the observed findings from the instrument. The problems associated with the resistance hygrometer technique are identified and the usage of the instrument in the physiological experimentation from the engineering standpoint is evaluated. Author

**N81-17683#** Academy of Natural Sciences of Philadelphia, Pa. Div. of Limnology and Ecology.

**PHYTOPLANKTON STUDIES AND NUTRIENT CONCENTRATIONS IN THE VICINITY OF THE C. P. CRANE GENERATING STATION** Final Report, Jul. 1979 - Mar. 1980

K. C. Sellner, L. A. Lyons, R. K. Mahoney, M. M. Olson, and E. S. Perry 17 Sep. 1980 75 p refs Sponsored by Maryland Dept. of Natural Resources  
(PB81-114746; PPSP-CPC-80-5) Avail: NTIS  
HC A04/MF A01 CSCL 06F

Plant operations appeared to stimulate phytoplankton productivity at plant discharge and in upper Saltpeter Creek. Carbon fixation rates and assimilation ratios were enhanced in wholewater and nanoplankton size fractions for the three upper Saltpeter Creek stations compared to data collected at intake (Seneca Creek). However, few significant alterations in phytoplankton biomass (chlorophyll alpha) resulting plant operations were noted in the vicinity of the C.P. Crane plant. Enhanced productivities were probably a function of ambient water temperature. Delta Ts observed between intake and the impacted areas and species composition of the phytoplankton. GRA

**N81-17686#** Army Research Inst. of Environmental Medicine, Natick, Mass. Military Ergonomics Div.

**PHYSIOLOGICAL AND HEMATOLOGICAL RESPONSES TO SUMMER AND WINTER DRY-HEAT ACCLIMATION**

Yair Shapiro, Roger W. Hubbard, Claire M. Kimbrough, and Kent B. Pandolf 25 Jul. 1980 35 p refs  
(AD-A093194; USARIEM-M-31/80) Avail: NTIS  
HC A03/MF A01 CSCL 06/19

Differences between acclimation to heat at the end of winter (W) and at the end of summer (S) were studied on the same 8 male volunteers. Subjects were exposed to 40 C, 30% rh for 10 days on two separate occasions approximately 5 months apart (S and W). Daily exposures lasted 120 min, 10 min rest, 50 min walking 1.34m/s on the level, 10 min rest, 50 min walking. During W acclimation, rectal temperature (Tre) and heart rate (HR) decreased, sweat rate (msw) remained unchanged, and plasma and red cell volume of the blood expanded. During S acclimation, HR decreased while Tre and msw remained unchanged, and plasma volume increased. The Tre of the acclimated subjects remained higher in W and msw lower than in S. It was concluded that acclimation does not totally eliminate the seasonal differences in thermoregulatory set-point and sweat sensitivity. Further, acclimation to a more severe heat did not improve the thermoregulatory set-point that was achieved by natural acclimatization to a milder heat, but affected the cardiovascular adjustment and caused greater plasma volume expansion. W acclimation caused both plasma and blood cell volume expansion while S acclimation affected only plasma volume. GRA

**N81-17696/** Army Research Inst. of Environmental Medicine, Natick, Mass.

**THERMAL COMFORT IN AN ERA OF ENERGY SHORT-AGE**

Ralph F. Goldman 6 Oct. 1980 27 p refs  
(AD-A093193; USARIEM-M-30/80) Avail: NTIS  
HC A03/MF A01 CSCL 15/5

Human thermal comfort rests upon the interactions among six key factors: four from the environment and two regulated by the individual and his job. The four ambient environmental factors include air temperature, air motion, vapor pressure, and the mean radiant temperature of the surroundings. Heat production and clothing are the individual factors. The correlation of these factors were studied and the results for office environments are presented. T.M.

**N81-17697/** Connecticut Univ., Storrs.  
**TOXICOLOGY AND METABOLISM OF NICKEL COM-  
POUNDS: COMPREHENSIVE REPORT OF OVERALL  
ACTIVITIES DURING THE THREE-YEAR PERIOD FROM  
1 DECEMBER 1977 - 30 NOVEMBER 1980**

F. W. Sunderman, Jr. 15 Aug. 1980 18 p refs  
(Contract DE-AS02-78EV-03140)  
(DOE/EV-03140/5-T1) Avail: NTIS HC A02/MF A01

The principal areas of investigation were: embryotoxicity, teratogenicity, and mutagenicity of nickel carbonyl; metabolism, detoxification, and excretion of nickel compounds; studies of nickel carcinogenesis; nickel analysis in body fluids and tissues to monitor occupational exposures; and nephrotoxicity of nickel compounds. The hematological effects of nickel compounds were also examined. DOE

**N81-17698/** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**SPATIAL DISORIENTATION IN FLIGHT: CURRENT  
PROBLEMS**

G. Perdiel, ed. (French Air Force, Paris) and A. J. Benson, ed. (RAF, Farnborough, England) Oct. 1980 99 p refs In ENGLISH and FRENCH Proc. of Conf. held in Bodo, Norway, 20-23 May 1980

(AGARD-CP-287; ISBN-92-835-0278-7) Avail: NTIS  
HC A05/MF A01

The correlation between spatial disorientation in flight and the occurrence of aircraft accidents is discussed in detail. Particular attention is placed on determining the perceptual errors that characterize spatial disorientation in flight.

**N81-17699/** Centre de Recherches du Service de Sante des Armees, Clamart (France).

**PHYSIOLOGICAL MECHANISMS OF SPATIAL DISORIEN-  
TATION NOT OF VISUAL ORIGIN [LES MECHANISMES  
PHYSIOLOGIQUES DE LA DESORIENTATION SPATIALE  
D'ORIGINE NON VISUELLE]**

J. Colin /In AGARD Spatial Disorientation in Flight Oct. 1980 6 p refs In FRENCH

Avail: NTIS HC A05/MF A01

Spatial orientation involves the complex integration of data emanating from numerous receptors. In most cases, a disorientation occurs when the visual system, which plays the principle role, can no longer perform its function and the other systems are influenced by a gravito-inertial environment. The reactions thrown out of gear by linear and radial acceleration and then by angular acceleration are reviewed. For a third time the factors modifying the intensity of these reactions are recalled. This permits insisting on the concept of visual dominance and vestibular suppression, which is at the origin of the essential means of preventing spatial disorientation in flight. An aeromedical formation of the crew is particularly important in the visual presentation of information required for piloting, for repeated carry over for flight formation and for flight without visibility. Transl. by A.R.H.

**N81-17700/** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

**AN UPDATE OF FINDINGS REGARDING SPATIAL**

**DISORIENTATION IN FLIGHT: A RECONSIDERATION OF  
UNDERLYING MECHANISMS**

F. H. Monesi /In its Spatial Disorientation in Flight Oct. 1980 6 p refs

Avail: NTIS HC A05/MF A01

The anatomical foundations, physiological mechanisms and mental functions known to influence spatial orientation on Earth and in flight are reviewed. The effects of flight environment on visual, vestibular and kinaesthetic cues as well as on mental functions able to induce perceptual errors conducive to spatial disorientation are reconsidered with a view of identifying the theories accounting for disorientation incidents and accidents in flight. R.C.T.

**N81-17701/** Italian Air Force Medical Services, Bari-Palese AFB.

**PERCENTUAL ERRORS IN FLIGHT: A SURVEY OF 100  
MILITARY PILOTS ON ACTIVE DUTY**

Pietro DeGiosa /In AGARD Spatial Disorientation in Flight Oct. 1980 7 p refs

Avail: NTIS HC A05/MF A01

A survey was given to 80 pilots and 20 cadet pilots in flight activity to determine some of the problems associated with perceptive disturbances in flight. The survey consisted of 116 questions, divided into 6 major parts: the first contains biographical data such as age, total hours of flight and the hours of flight activity during 1979, type of aircraft piloted, flight accident if any; the second part is relative to the possible correlation between on the one hand psycho-affective or psycho-social situation and type of mission and on the other hand disturbances if any; the third part refers to the correlation between on the one hand physical conditions, life, habits, the use of drugs and on the other hand possible perceptive alterations they can cause; the fourth part investigates the relations between the type of aircraft and perceptive alterations; the fifth part deals with different atmospheric conditions in which the flight is possible; with some of the questions we investigate the duration of the disturbances and the time of the disappearance of these perceptive disturbances initially felt; and the last part investigates the perceptive disturbances suffered out of the flight and the quality considered indispensable in avoiding them. R.C.T.

**N81-17702/** Pennsylvania State Univ., University Park.  
**THE AMBIENT VISUAL SYSTEM AND SPATIAL ORIENTA-  
TION**

H. W. Liebowitz and J. Dichgans (Tuebingen Univ.) /In AGARD Spatial Disorientation in Flight Oct. 1980 4 p refs

(Grants MH-08061; EY-03276)

Avail: NTIS HC A05/MF A01

Two modes of processing visual information are reviewed with particular emphasis on their independent functions and the role of the ambient visual system in orientation. The multisensory basis of orientation and the central integration of signals are discussed. Disorientation is assumed to result from a mismatch, in comparison with the previous experience of the individual, of these simultaneously occurring signal patterns. It is suggested that disorientation in aircraft under instrument flight conditions may result from the substitution of an unnatural symbolic indicator to replace the visual stimuli normally involved in orientation and the failure of a learned cognitive skill to compensate for mismatched signals. R.C.T.

**N81-17703/** School of Aerospace Medicine, Brooks AFB, Tex. Ophthalmology Branch.

**VISUAL ILLUSIONS AS A PROBABLE CAUSE OF AIRCRAFT  
ACCIDENTS**

Thomas J. Tredici /In AGARD Spatial Disorientation in Flight Oct. 1980 5 p refs

Avail: NTIS HC A05/MF A01

Spatial disorientation, visual restrictions, and illusions were examined as the possible causal factors in aircraft accidents. A number of aircraft accidents were analyzed in which visual illusions appear to be a significant or contributing factor in the accident. It is shown that such factors as rain on the windshield,



flashblindness by high intensity strobe lights, disorientation by flickering lights, and ground light intensity variations appear to have led to errors in judgement, thus directly contributing to the aircraft accident. It is concluded that a studied awareness of these factors is the pilot's best corrective action available.

R.C.T.

**N81-17704#** Army Air Corps, Stockbridge (England).  
**DISORIENTATION IN ARMY HELICOPTER OPERATIONS:  
 A GENERAL REVIEW**

K. Edgington and C. J. Box /In AGARD Spatial Disorientation in Flight Oct. 1980 9 p refs

Avail: NTIS HC A05/MF A01

Accidents involving aircraft mishandled during takeoff, landing or tactical low flying (or nap of the earth flight) were investigated. Special emphasis was placed on examining those accidents which occurred as a result of flight disorientation. Orientation error rates, the type of accidents as well as influencing factors were reviewed. Significant results are reported.

R.C.T.

**N81-17705#** Centre d'Essais en Vol, Bretigny-sur-Orge (France).  
 Lab. de Medecine Aerospatiale.

**ILLUSIONS OF ATTITUDE AND MOVEMENT DURING  
 EARTH-HORIZONTAL ROTATION**

Alain Leger, Jack P. Landolt, and Kenneth E. Money /In AGARD Spatial Disorientation in Flight Oct. 1980 19 p refs In ENGLISH and FRENCH Prepared in cooperation with Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario

Avail: NTIS HC A05/MF A01

Ten voluntary males underwent a sequence of experiments to determine the effect of rotation about the horizontal axis. Each subject underwent nine separate tests of rotation about the horizontal axis. The number of tests was determined by the number of combinations of the three subject axes (X, Y and Z) and three visual conditions (no visual reference, internal visual reference, and external visual reference). In the first condition, the subject was in total darkness (NVR). The internal visual reference (IVR) was produced by lighting the interior of the gondola. Finally, in the external visual reference (EVR) condition, the gondola hatch was left open and the subject could see the surrounding laboratory, with a visual field of about 60 X 50 deg. The order of tests for each subject was determined by a nine by nine Latin square. In spite of the strong visual input, convincing illusions of attitude and movement were found in the IVR condition. Similar illusions, of course, were experienced in the NVR condition. Comparable illusions occurred during the X-axis and Y-axis rotations, as well as during the (usually employed) Z-axis rotations. In most subjects, the illusions were absent in the EVR condition, but, in some subjects, there was perceptible illusory movement inspite of clear visual reference to the real motion.

R.C.T.

**N81-17706#** Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

**ORTHOSTATIC DISORDER. A CONTRIBUTING FACTOR  
 TO MOTION SICKNESS?**

G. R. Froehlich /In AGARD Spatial Disorientation in Flight Oct. 1980 4 p refs

Avail: NTIS HC A05/MF A01

Pilot candidates were subjected to the vestibular adroitness test to determine the effects of orthostatic disorders on motion sickness. The test consisted of bending the head once 60 degrees downward and back to the upright position while being rotated at 180 degrees/sec. The test was divided into four categories: each category producing a varying degree of motion sickness symptoms (i.e., mild nausea to severe nausea). Significant results as well as the conclusions are presented in detail.

R.C.T.

**N81-17707#** Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Head/Biodynamics Section.

**A GENERALIZED TRANSFER FUNCTION FOR DESCRIBING  
 MECHANONEURAL SEMICIRCULAR-CANAL DYNAMICS**

Jack P. Landolt (Texas Univ., Galveston) and Manning J. Correia /In AGARD Spatial Disorientation in Flight Oct. 1980 10 p

refs

Avail: NTIS HC A05/MF A01

The dynamic response characteristics of the semicircular canal to rotational head movements were determined via a generalized transfer function. The adequacy of the model was tested by recording the neural activity of the primary efferent fibers innervating the semicircular canals as they respond to appropriate stimulation. Specifically the mechanoneural response characteristics of primary afferent, semicircular canal units in the pigeon were studied to determine whether the model could be used in describing the neurodynamics in other species.

R.C.T.

**N81-17708#** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**A MULTISTATION SPATIAL DISORIENTATION DEMONSTRATOR**

Fred E. Guedry, Jr. /In AGARD Spatial Disorientation in Flight Oct. 1980 P refs

Avail: NTIS HC A05/MF A01

A disorientation familiarization trainer was designed and constructed for demonstrating a range of visual and acceleratory conditions that induce disorientation. The demonstrator provides students with memorable personal experiences with various classes of disorientating conditions coupled with an introduction to disorientation-error prevention.

P.C.T.

**N81-17709#** Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

**THE ROYAL AIR FORCE SPATIAL DISORIENTATION  
 FAMILIARISATION DEVICES (SDFD)**

A. J. Benson /In AGARD Spatial Disorientation in Flight Oct. 1980 10 p refs

Avail: NTIS HC A05/MF A01

The Spatial Disorientation Familiarization Device (SDFD) was designed to demonstrate to aircrew the fallibility of their senses and the errors of perception that can lead to spatial disorientation in flight. The SDFD is a servocontrolled turntable on which the subject is seated 1 m from the axis of rotation, inside a light-tight cab. Displays within the cab show the subject that his sensations of rotation and attitude are in error, and permit the demonstration of oculogyral, oculogravic, cross coupled (Coriolis) and autokinetic phenomena. Control of the velocity trajectory of the turntable and the illumination of the various displays may be preprogrammed and recorded along with a commentary on magnetic tape. This facility allows an optimized training sequence to be delivered consistently, even by relatively unskilled operators.

R.C.T.

**N81-17710#** Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany). Forschungsgesellschaft fuer Angewandte Naturwissenschaften e. V.

**ON THE PRACTICE OF MEASURING SENSORY THRESHOLDS: SIGNAL DETECTION AND THE ADAPTIVE METHOD [ZUR PRAXIS DER WAHRNEHMUNGSSCHWELLENMESSUNG: SIGNALENTDECKUNGSANALYSE UND ADAPTIVE VERFAHREN]**

S. Trispeil May 1979 117 p refs In GERMAN; ENGLISH summary Prepared in cooperation with Helmholtz-Inst. fuer Biomed. Tech.

(FB-43) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Ger. DM 10

After an introduction to the principles of psychophysical threshold measurement, the fundamentals of signal detection theory and of adaptive measurement techniques, in each case confined to absolute threshold measurement, are discussed. Both procedures are compared regarding their practical usefulness and levels of significance. The application of both procedures is described for the same situation, subjects had to detect a step like velocity change (with a given a priori probability) of a horizontally moving object on a CRT screen. The results, gathered from relatively small groups of subjects, demonstrate in detail some of the inherent effects of these procedures. An adaptive, automatized test for visual acuity measurement is described as an example for the construction of an adaptive measurement strategy. Finally, the differences between both procedures as to

their range of applications are considered. It is concluded that the results of signal detection analysis yield true threshold values, whereas results from adaptive experiments often are influenced by the employed adaptive logic. Author (ESA)

**N81-17711#** San Jose State Univ. Foundation, Calif.  
**MAGNITUDE OF VISUAL ACCOMMODATION TO A HEAD-UP DISPLAY**

Edward F. Leitner and Richard F. Haines Feb. 1981 12 p refs  
 (NASA-TP-1796; A-8379; HUD-15) Avail: NTIS HC A02/MF A01 CSCL 01D

The virtual image symbology of head-up displays (HUDs) is presented at optical infinity to the pilot. This design feature is intended to help pilots maintain visual focus distance at optical infinity. However, the accommodation response could be nearer than optical infinity, due to an individual's dark focus response. Accommodation responses were measured of two age groups of airline pilots to: (1) static symbology on a HUD; (2) a landing site background at optical infinity; (3) the combination of the HUD symbology and the landing site background; and (4) complete darkness. Results indicate that magnitude of accommodation to HUD symbology, with and without the background, is not significantly different from an infinity focus response for either age group. The dark focus response is significantly closer than optical infinity for the younger pilots, but not the older pilots, a finding consistent with previous research. R.C.T.

**N81-17712#** DBA Systems, Inc., Lanham, Md. Research Inst.

**DESIGNER'S GUIDE FOR THE PANEL PROGRAM Technical Interim Report**

Medhat Korna and Nilss Aume Oct. 1980 68 p  
 (Contract F33615-78-C-0507; AF Proj. 7184)  
 (AD-A093989; UDR-TR-80-64; AMRL-TR-80-124) Avail: NTIS HC A04/MF A01 CSCL 09/2

This designer's guide describes an interactive computer graphics program intended for the computer aided design of avionics control and display panels. Using this program, a designer can specify the basic panel on which all other components will be mounted as well as the components themselves. Also, he can locate and relocate the components, add graphic elements (text, lines, circles), and call for printed, punched, or hard copy (plot) output. The requirements and considerations of several applicable MIL-STANDARDS have been incorporated into the program to facilitate the design process. The Guide to the operation of the PANEL program includes descriptions of the processing available for each of the program functions and subfunctions. A listing of the program is also included along with a brief description of most of the subroutines. GRA

**N81-17713#** General Electric Co., Syracuse, N.Y. Military Electronic Systems Operation.

**COMPUTER-AIDED DEVELOPMENT OF CONTROL CONSOLE, CONTROL PANEL, AND DISPLAY USER INSTRUCTIONS AND TRAINING MATERIALS**

S. A. Solow and W. O. Mills Oct. 1980 13 p  
 (AD-A093891; R80EMH9) Avail: NTIS HC A02/MF A01 CSCL 09/2

This technical information series (TIS) outlines a procedure for developing instructions and training materials for control panel operation and indicator and display interpretation. The method is particularly advantageous when the operator has to observe and respond to large amounts of data and manipulate many controls. The process is described in this TIS as it is applied to the preparation of information for the tactical towed array sonar (TACTAS) System Operator's Manual. However, it can be applied with slight modification to systems having similarly complex man-machine interfaces. Data input, storage, processing, and output are performed by the time-share subsystem (TSS) of the Honeywell 520 Data Processing System (level 66). GRA

**N81-17714#** Ingenieurbuero fuer Ergonomie, Munich (West Germany).  
**ERGONOMIC STUDY OF THE INFLUENCE OF ROTARY**

**VIBRATIONS [ERGONOMISCHE UNTERSUCHUNGEN UEBER DIE EINWIRKUNG ROTATORISCHER SCHWINGUNGEN. BEANSPRUCHUNG DURCH ROLLSCHWINGUNGSBELASTUNG]**

Wilhelm Ilgmann Bonn Bundesministerium fuer Verteidigung 1979 133 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Verteidigung (BMVg-FBW-79-33) Avail: NTIS HC A01/MF A01; DOKZENTBW, Bonn DM 40

For the measurement of the effects of sinusoidal rotary whole-body vibrations on man, a two-degree of freedom motion simulator for roll and pitch vibrations was designed and built. Using the method of producing stimuli ratios, roll vibration strain up to the tolerance limit was investigated in the frequency range from 1 to 10 Hz. Results demonstrate that the psychophysical law of Stevens is appropriate to describe the relationship between vibration stress and subjective sensation. Although the deviation between subjects is quite large, in the frequency range investigated the exponent of the psychophysical law is found to be constant. The correlation between subject's individual reaction and physiological data, such as weight and stature, is small. In consequence of the divergent results concerning the magnitude of sensation related to the same intensity level of vibration, percentiles are recommended to set exposure limits.

Author (ESA)

**N81-17715#** Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany). Forschungsgesellschaft fuer Angewandte Naturwissenschaften e. V.

**MONITORING AND DECISION MAKING BY PEOPLE IN MAN MACHINE SYSTEMS [UEBERWACHUNGS- UND ENTSCHEIDUNGSVERHALTEN DES MENSCHEN IN MENSCH-MASCHINE-SYSTEMEN]**

G. Johansen May 1979 92 p refs Partly in GERMAN and ENGLISH

(Grant NSG-2119)

(NASA-CR-184026; FB-44) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10 CSCL 05H

The analysis of human monitoring and decision making behavior as well as its modeling are described. Classic and optimal control theoretical, monitoring models are surveyed. The relationship between attention allocation and eye movements is discussed. As an example of applications, the evaluation of predictor displays by means of the optimal control model is explained. Fault detection involving continuous signals and decision making behavior of a human operator engaged in fault diagnosis during different operation and maintenance situations are illustrated. Computer aided decision making is considered as a queueing problem. It is shown to what extent computer aids can be based on the state of human activity as measured by psychophysiological quantities. Finally, management information systems for different application areas are mentioned. The possibilities of mathematical modeling of human behavior in complex man machine systems are also critically assessed.

Author (ESA)

**N81-17716#** Office of Technology Assessment, Washington, D. C.

**ENVIRONMENTAL CONTAMINANTS IN FOOD. VOLUME 2, PART B: WORKING PAPERS**

Jan. 1980 557 p refs Sponsored by Office of Technology Assessment, Washington  
 (PB81-116774-Vol-2-Pt-B) Avail: NTIS HC A24/MF A01 CSCL 06F

The contents include: toxic substances in food information systems; design and management; assessment of carcinogenic risks from PCBs in food; economic analysis of alternative action levels in the regulation of environmental contaminants in food and analysis of foods for radioactivity. Approaches to monitoring environmental contaminants in food and analytical systems for the determination of metals in food and water supplies are described. Assessment of methods for regulating 'unavoidable' contaminants in the food supply and consumer risk from environmental contaminants in food were determined. GRA

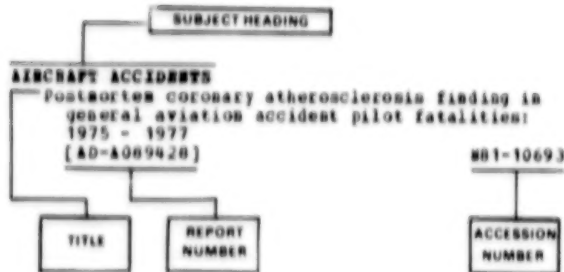


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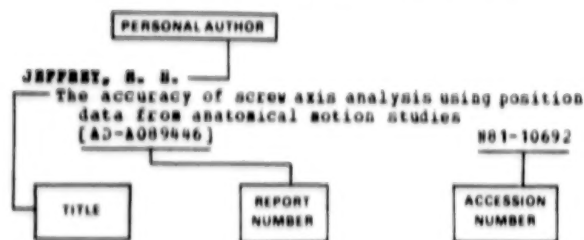


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